FOUNDRY

EST. 1902

TRADE JOURNAL

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

VOL. III
No. 2330
Registered at the G.P.O. as a Newspaper

AUGUST 3, 1961
Offices: John Adam House, John Adam St., London, W.C.2

Single Copy 1/-. By Post 1/4. Annual Subscription, Home 52/-, Abroad 60/- (Prepaid)

FOUNDRY SUNDRIES

LADLES, RIDDLES, MOULDING BOXES, BRUSHES, CORE OIL, PROTECTIVE CLOTHING . . .

Write for any, or all, of these new catalogues:-

1. FOUNDRY EQUIPMENT & SUPPLIES
2. INDUSTRIAL PROTECTIVE CLOTHING
3. INDUSTRIAL SAFETY EQUIPMENT

THOS. W. WARD LTD

ALBION WORKS · SHEFFIELD · Phone: 26311 · Telex 54.119

LONDON OFFICE: BRETTENHAM HOUSE · LANCASTER PLACE · STRAND W.C.2. Phone TEM-BAR 1515

Above: Mould half for a 15 ton casting. Cold set Corovit mixes are immensely strong and do not sag.

Below: Corovit rib cores are as accurate as the core boxes from which they are made.

MASSIVE CORES AND MASSIVE SAVING

Coremaking time reduced from 200 to 94 hours using Fordath's "Corovit" cold-setting technique—but men's earnings are up by 15% in piece-work bonuses.

Corovit cold setting core techniques have been applied in the building-up of the upper half of this mould for the table of a 22 ft. diameter vertical boring mill. Corovit provides savings at every turn—reduced coremaking time, quicker stoving, easier knock-out. Dimensional stability and enormous strength mean that cores are far more accurate (less fettling and subsequent machining) with an improved surface finish.

Photographs by kind permission of George Richards & Co. Ltd., Broadheath, Altrincham, Cheshire.

Ask **FORDATH** about

COROVIT

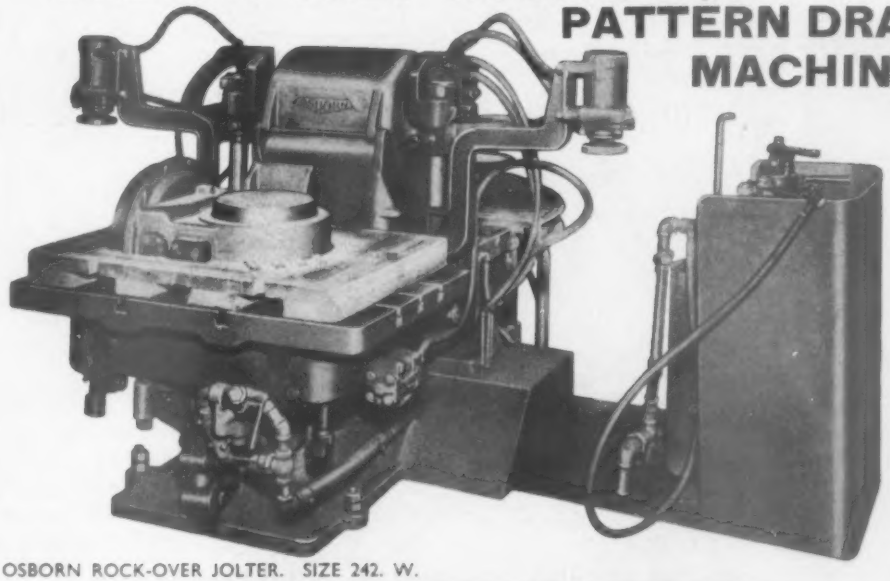
COLD SETTING TECHNIQUE

COROVIT is manufactured and sold in the U.K. solely by FORDATH, who prepay licence fees to Reichold Chemie A.G. of Switzerland. Reichold are the proprietors of British Patents 653,530 & 761,035. Thus foundries using COROVIT are automatically free from liability to suit for infringement of these patents when they use peroxide-group accelerators in their cold-setting work.

THE FORDATH ENGINEERING COMPANY LIMITED, BRANDON WAY, WEST BROMWICH, STAFFS, ENGLAND.
Telephone: West Bromwich 1665. Telegrams: Fordath Telex West Bromwich. Telex No.: 33415

JACKMAN – BUILT

OSBORN JOLT ROCK-OVER PATTERN DRAW MACHINES



OSBORN ROCK-OVER JOLTER. SIZE 242. W.

	242 W. M/C	643 M/C
MAX. BOX DIMENSIONS OVERALL:—		
LENGTH	OPEN END	OPEN END
WIDTH	30″	38″
JOLT CAPACITY	1500 lbs.	2000 lbs.
TABLE SIZE	29″ x 42″	35″ x 50″
DRAW STROKE UP TO	19″	21″
COMBINED BOX SPACE & PATTERN DRAW	31″	33″

PNEUMATIC CLAMPS OPERATE IN TANDEM

OPEN ENDS PERMIT WIDE VARIATION OF BOX LENGTH

AIR CLAMPS LOCK LEVELLING MECHANISM WHICH TAKES CARE OF VARIATIONS IN BOTTOM BOARDS

AIR CONTROLLED PATTERN DRAW GIVES SLOW & FAST DRAW

CONVEYOR ROLLER ON LEVELLING MECHANISM CAN BE ARRANGED FOR ROLL-OUT EITHER ON CENTRE LINE OF MACHINE OR AT RIGHT ANGLES

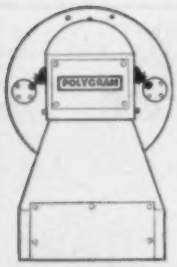
'T' SLOTS ARE PROVIDED IN TABLE FOR QUICK PATTERN CHANGE

J. W. JACKMAN & COMPANY LIMITED

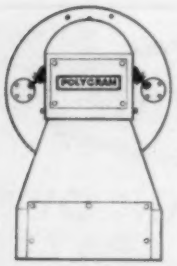
VULCAN WORKS · BLACKFRIARS ROAD · MANCHESTER 3

Telephone: DEAnsgate 4648-three lines *Telegrams:* Blast, Manchester

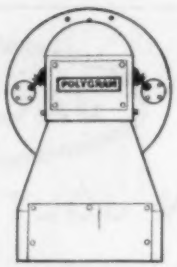
A



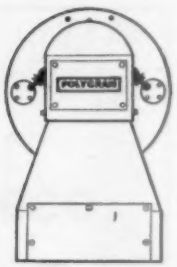
SHELL COREMAKING



SHELL MOULDING

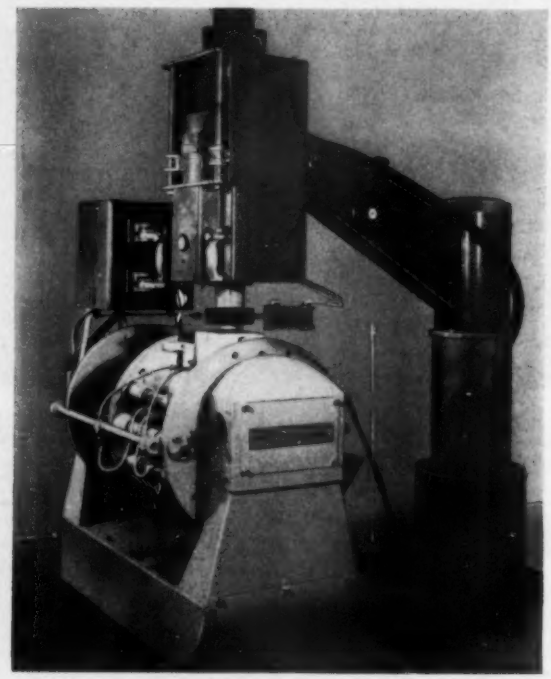


HOT-BOX PROCESS



GRAVITY DIECASTING

ONE . . . Polygram MANIPULATORS for SHELL COREMAKING



This shows a Manipulator in use with the latest Polygram column-mounted Coreblowing head.

Polygram Manipulators are the ideal method for handling large shell coreboxes (up to a maximum size of 28in. by 18in.) since they offer the following advantages:—

Full pneumatic operation from closing box to ejection of core.
Automatic control of operation if desired.
Temperature of each half of corebox electrically regulated within ±5°C.
Can be used with existing core blowers or shooters.
Single-Station Core Blower (see above) can be built up to Six-Station Machine by adding Manipulators.

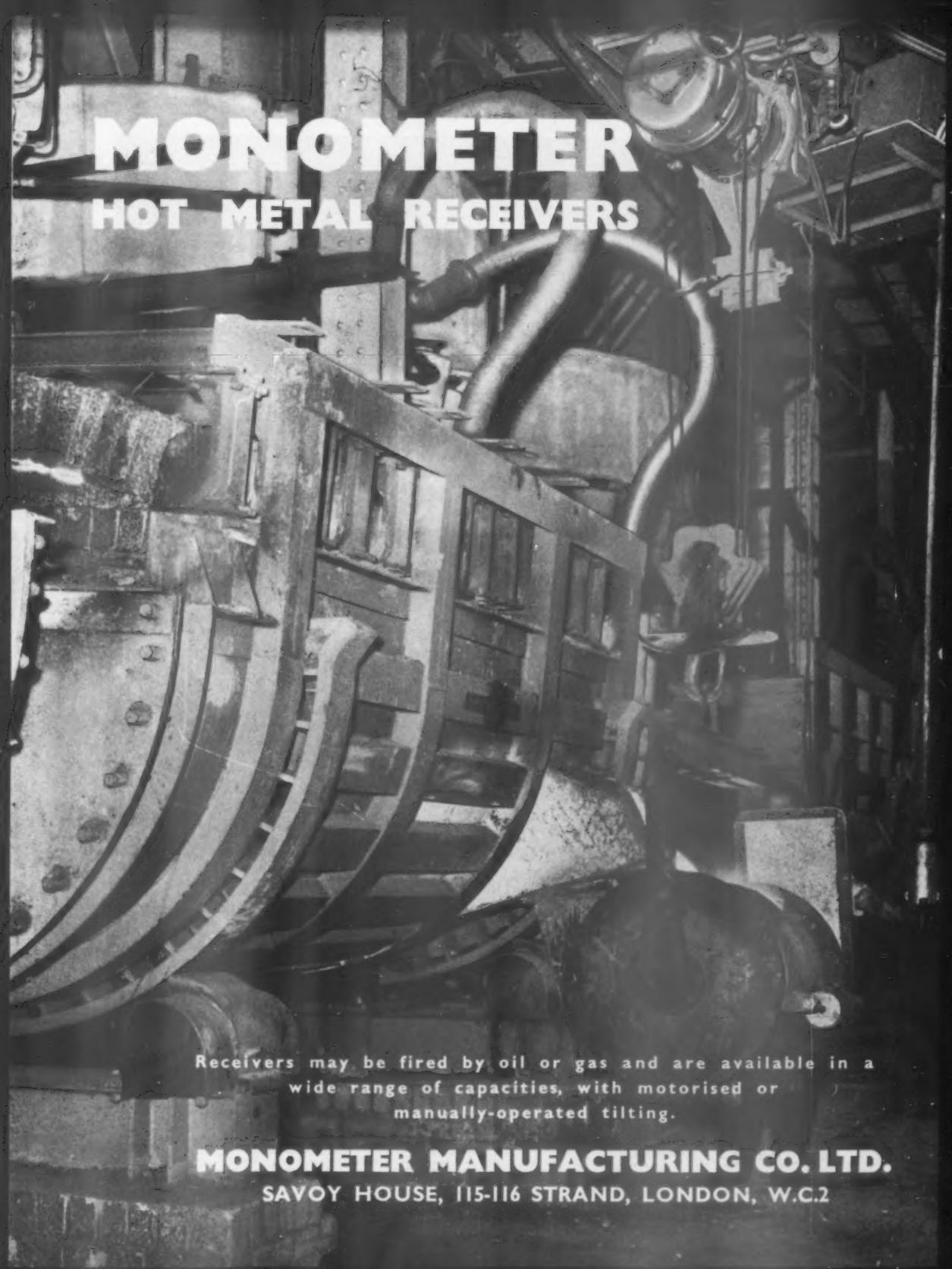
Further Details From

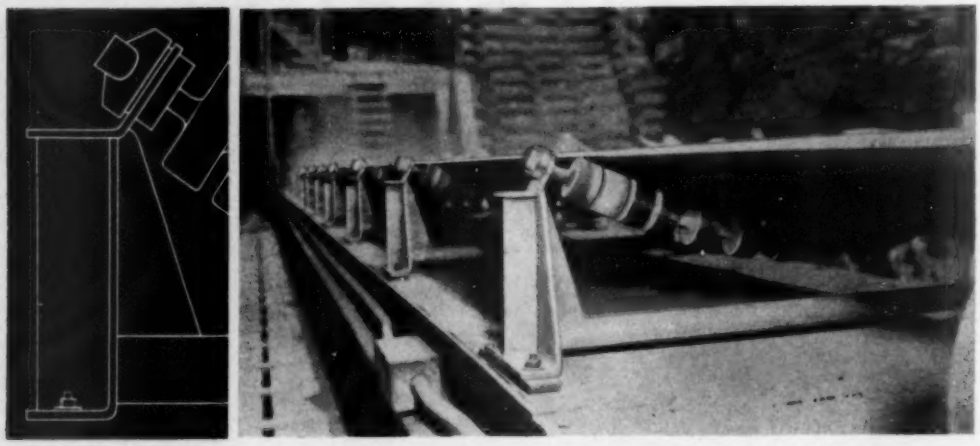
Polygram *Casting Company Limited*

THE FIRST NAME IN SHELL MOULDING

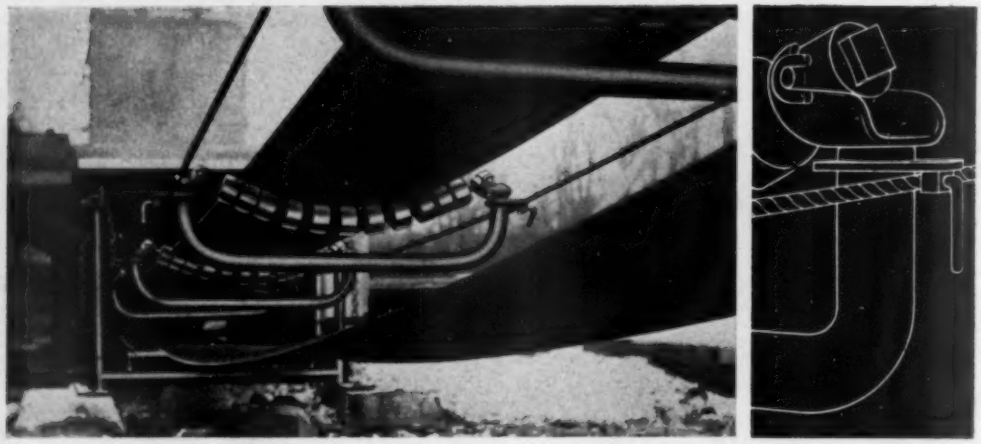
SHERNFOLD PARK, FRANT, TUNBRIDGE WELLS, KENT, ENGLAND.
TEL. FRANT 346

The Only British Specialists in Shell Moulding and Coremaking


MONOMETER
HOT METAL RECEIVERS
Receivers may be fired by oil or gas and are available in a wide range of capacities, with motorised or manually-operated tilting.
MONOMETER MANUFACTURING CO. LTD.
SAVOY HOUSE, 115-116 STRAND, LONDON, W.C.2



TWO SAVING WAYS WITH BELT CONVEYORS



JOY LIMBEROLLER IDLERS & LIMBEROPE CONVEYOR STRUCTURE

For the permanent structure—Joy Limberoller; a flexible conveyor idler that shapes itself to the load and can handle any bulk material transported by belt conveyors. It's saving? Because Joy Limberollers consist of hard wearing Neoprene discs moulded onto a flexible steel cable they exercise a self-cleaning action that saves belt and idler from damage, caused by material build-up under the belt. They cut spillage by giving a bump-free ride and need no maintenance. Joy Limberope conveyor structures offer all the savings of the Joy-Limberoller plus easier and faster set-up, dismantling and relocating. They give a well-trained belt, are low in first cost... maintenance cost, and are easily transported from site to site. Savings indeed for any thrifty belt conveyor user!

JOY · SULLIVAN LTD

Bulletin CO.361 with full details will be sent on application to:- **Joy-Sullivan Limited 7 Harley Street, London W.1.** or any of the following Distributors :—

NORTHERN:
HILL PORTER (NEWCASTLE) LTD.
14 CLAREMONT PLACE,
NEWCASTLE UPON TYNE, 2

NORTH WESTERN:
ATLANTIC RUBBER LTD.
ATLANTIC STREET,
BROADHEATH,
ALTRINCHAM, CHESHIRE

SCOTTISH:
POTTER COWAN & CO. LTD.
54 FRENCH STREET,
GLASGOW, S.E.

MIDLAND:
THE CENTRAL MANUFACTURING & TRADING CO. (DUDLEY) LTD.
HALESOWEN ROAD,
OLD HILL, STAFFS.

NORTH EASTERN:
GLOVER & WOOD OF LEEDS
VICTORIA WORKS,
LEEDS, 11

SOUTH EASTERN:
SOUTHERN INDUSTRIAL RUBBER LTD., 1 HIGH STREET,
SOUTH NORWOOD,
LONDON, S.E.25

NORTHERN IRELAND:
G. V. BAIRD & CO.
324 STRENMILLIS ROAD,
BELFAST, 9

SOUTH WESTERN:
JACKSON ENGINEERING SERVICES (BRISTOL) LTD.
WOODSIDE, TICKENHAM,
CLEVEDON, SOMERSET

EIRE:
H. R. HOLFELD LTD.
2/4 MELVILLE ROAD,
STILLORGAN, DUBLIN

Because

WET SCRUBBING will reclaim used sand in condition equal to new

you can now save hundreds of £'s

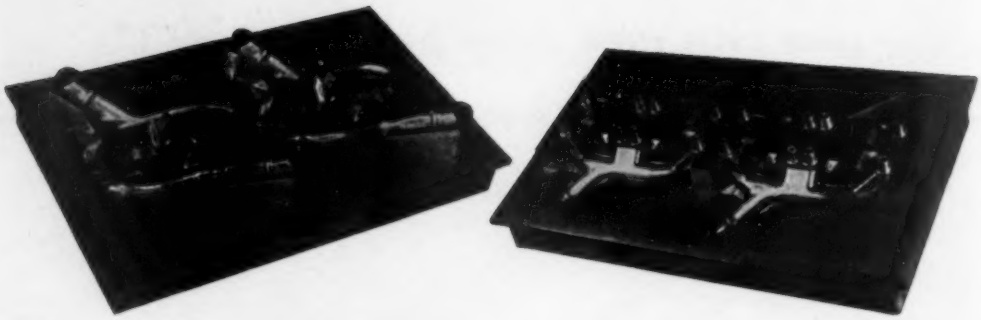
Used core sand whether oil, resin, C.O.2, air set or clay bonded can now be reclaimed in condition equal to new. This is achieved by wet scrubbing and counterflow classification. The potential savings in many foundries can amount to hundreds of £'s per annum. If you are interested, please ask for an engineer to call.

Made in England by

PNEULEC LTD., SMETHWICK, Nr. BIRMINGHAM

UNBEATABLE!

PRESSURE by CAST



CROCKETT LOWE LIMITED

THE LATEST METHODS FOR THE FINEST PATTERNS of course!

Designers and Manufacturers of Pattern Equipment by Craftsmen who know every phase of Pattern Making and have practised it to its Finest Skill. Our DRAWING OFFICE FACILITIES, TECHNICAL CONSULTANT SERVICE, and above all SPECIALISED MACHINERY and MODERN EQUIPMENT assure maximum economy in every step of the procedure.

This is why leading manufacturers rely on us for the utmost accuracy, economy and production technique in Wood and Metal Pattern Equipment engineered to fit the needs of your foundry.

Expert Pattern Moulders in our own Foundry produce :—PRESSURE CAST COPE and DRAG PLATES, **SINGLE** AND DOUBLE SIDED MATCH PLATES in ALUMINIUM & BRONZE, SHELL MOULDED PATTERN EQUIPMENT, EPOXY RESIN AND ALL TYPES OF WOOD AND METAL PATTERN EQUIPMENT for the Engineering, Automobile, Aircraft, Electrical, Marine, Shipbuilding and Allied Trades.

PATTERN MAKERS TO BRITISH INDUSTRY

NUCLEAR HOUSE, SUMMER HILL STREET, BIRMINGHAM 1

Telephone : CENtral 5371-2 Telegrams : NUCLEAR, BIRMINGHAM

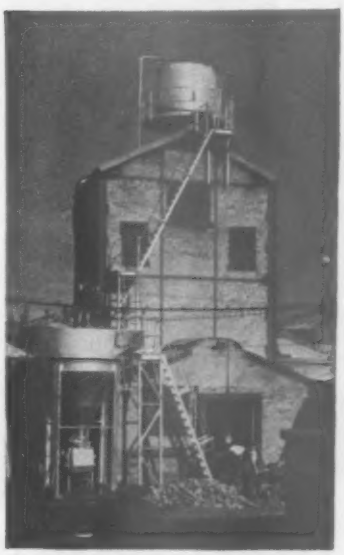
Coarse as grit . . .
fine as fume;

dust

If you want to control it, collect it, separate it, extract it, the people to get in touch with are Filter-Heat Ltd.

WHY?

For a very sound reason. They are not committed to any particular method of dust collection but are concerned with one thing only – the best way to trap a particular type of particle. It might be done with cyclones, cloth filters, wet collectors – or a combination of these. Filter-Heat makes them all. On a cupola, for example, they would recommend a water screen grit and spark arrester. The one illustrated here removes between five and six times as much grit and dust as the dry arrester it replaced. It also removes a considerable proportion of the sulphur in the gases. If you have a dust or grit problem; ring Leigh Lancs 72101 – or (in London) Abbey 3085. Filter-Heat take over from there.



Cupola at Willenhall equipped with a Filter-Heat grit and spark arrester – at Monmer Foundry Limited in St. Annes Rd.

FILTER-HEAT LTD

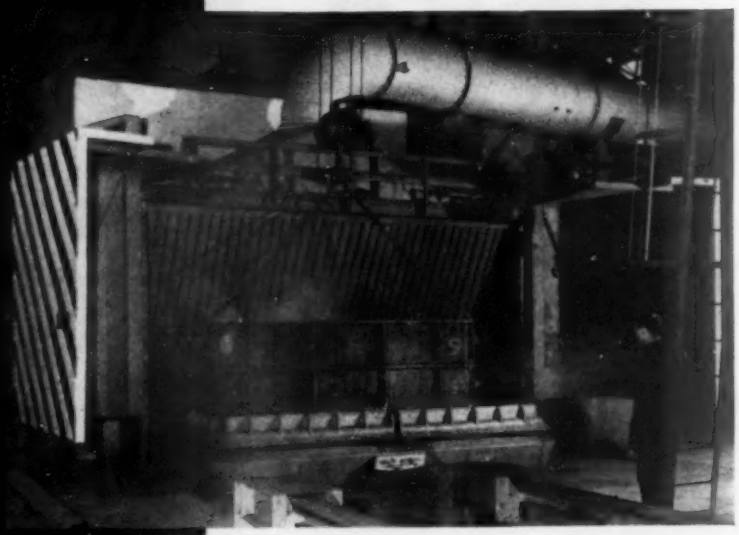
(a subsidiary of Sutcliffe, Speakman & Co. Ltd)

GUEST STREET · LEIGH · LANCASHIRE

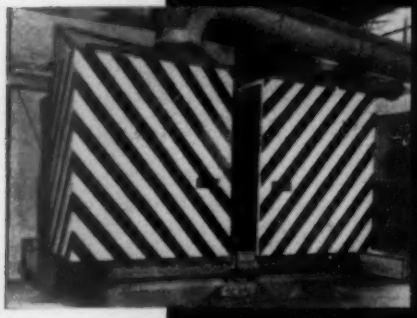
LONDON OFFICE: 2 CAXTON STREET · SW1

HOLMES-SCHNEIBLE MULTI-WASH SYSTEM

for dust collection and control



The photographs show the doors in both the open and closed positions.



An interesting feature of the Holmes-Schneible Multi-Wash installation in the steel foundry of English Steel Castings Corporation Limited are the hydro-pneumatically operated doors enclosing the shake-out hood. These doors which were designed in co-operation with English Steel Castings Corporation Limited, have been very successful in operation and have resulted in a considerable saving of exhaust volume necessary at the shake-out position. The installation is completed by two size 138 type 'JC' collectors, a dewatering tank, hoods on the sand preparation plant, fan and ducting.

For full details write for a copy of Publication No. 80/23

W. C. HOLMES & CO. LTD.

Gas Cleaning Division, Turnbridge, Huddersfield

Telephones: Huddersfield 5280
London: Victoria 9971
Birmingham: Midland 6830

FOCUS ON 'FULBOND' N° 3

Moisture Content

The working moisture content of moulding sands varies in accordance with their basic composition. For green sand castings some natural sands are mouldable at high moisture while others reach the optimum at an appreciably lower level. Fresh deliveries of natural sands which cannot be dried off, may compel foundrymen to use a moulding sand which has a moisture content exceeding that of the optimum. The result of this is low green strength, low permeability, the risk of dissolved gases in the metal leading to porous castings, and burning on. One solution is to add as much dry returned sand to the new wet sand as possible; the returned sand, however, may contain up to 75% of its original temper moisture.

FULBOND can be helpful because it has great capacity for absorbing water and also because of its effective bond strength over a very wide range of moistures. The small extra cost of the occasional use of FULBOND is more than compensated for by cleaner and sounder castings and time saved in the fettling shop. No amount of scraping, brushing and cleaning will produce the same skin finish on castings as a good and properly balanced moulding sand.

For a copy of this Brochure please write to:-

THE FULLERS' EARTH UNION LIMITED

Patteson Court, Nutfield Road, Redhill, Surrey

A member of the Laporte Group of Companies

CMF58

NO. 10 PREPARED BLACKING

PHŒNIX

BLACKING or PLUMBAGO MIXTURE for the CO_2 process

STEELMOL *for STEEL and SPECIAL IRON CASTINGS*

SYNTHETIC GRAPHITE

HIGH CARBON BLACKING · TERRA FLAKE · COAL DUST
PLUMBAGO
AND "ALUMISH" FOR ALUMINIUM
Non-Silica PARTING POWDER

JAMES DURRANS & SONS LTD

PHŒNIX WORKS & PLUMPTON MILLS PENISTONE near SHEFFIELD
Telephone : PENISTONE 3121 and 3122 *Telegrams :* BLACKING, PENISTONE

STANTON AND STAVELEY low phosphorus foundry pig iron

This iron is machine cast and customers special requirements can be met within the limits of analysis shown.

It is particularly suitable for the Automobile Industry and for all High Quality Castings.

ANALYSIS		
	Total Carbon	3·4% min.
	Silicon	2·0—4·5% (in ranges of ·5%)
	Manganese	0·7—1·1%
	Sulphur	0·05% max.
	Phosphorus	0.25 % max.

TELEPHONE: ILKESTON 2121

A free and confidential metallurgical service is offered to customers in all aspects of foundry practice and technique.

STANTON AND STAVELEY SALES LIMITED NEAR NOTTINGHAM

SCRAP

disposal

COX AND DANKS LIMITED

BIRMINGHAM
Scapa Works
Langley Green
Oldbury, Birmingham
Tel: Broadwell 1611
Telex 33183

MANCHESTER
Frederick Road
Pendleton
Salford 6
Tel: Pendleton 2481
Telex 66448

SHEFFIELD
Stevenson Road
Attercliffe
Sheffield, 9
Tel: Sheffield 41216
Telex 54205

LONDON
Scapa House
Park Royal Road
London N.W.10
Tel: Elgar 5811
Telex 25239

And at Newcastle, Bedford, Cardiff, Bow, Coventry and Belfast.

S.14

Quality ingots

Speedy and efficient handling gives you a really first class delivery on all types of metal ingots. Years of experience in the manufacture of ingots, plus the knowledge of our customers particular requirements enables us to meet any individual demand.

HENEAGE INGOTS

IN BRASS, GUN METAL & PHOSPHOR-BRONZE

HENEAGE METALS LTD.

Heneage Street, Birmingham 7.
Telephone ASTon Cross 1177/8.

BMD

Heavy Duty

SLINGER

fully automatic design or with co-ordinate control system sand quantity 60 m³/h (35 cu. ft./min.) slinging speed up to 60m/sec. (197ft./sec.)

Stationary or mobile design • total arm length up to 9,5 m (31 ft.) Slinger motor up to 100 h.p. • inclinable ramming head • also suitable for manufacture of moulds for cast steel.

Plant with Gebr. Sulzer AG. Oberwinterthur/Switzerland.

We design and construct mechanical and automatic foundry plants and individual machines · sand conditioning plants · conveyor plants · moulding machines slingers · automatic moulding units · SHOT BLAST ROTOR machines hydraulic fettling plants · cupolas · charging installations · dust arresting plants

Please write for leaflets and quotations

BADISCHE MASCHINENFABRIK A.-G.
Seboldwerk
KARLSRUHE-DURLACH

Representatives in British Isles: Spembly Development Limited, 2330 Coventry Road, Sheldon, Birmingham 26, England.
Representatives in India: The [illegible] Co. [illegible] Ltd., P.O. Box 1081, Bombay, India.

HEPBURN • Pangborn

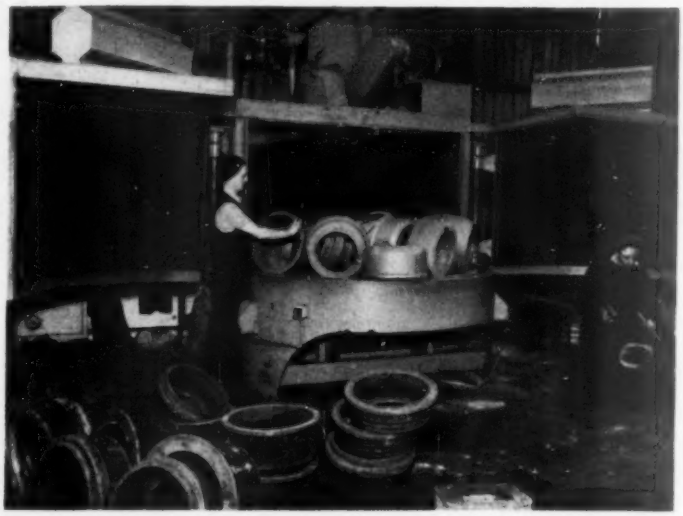
Solve the Problem

This company produces a diversity of castings in alloy iron and hematite iron. These include ingot moulds for the steel industry, brake drums and liners for Public Passenger vehicles, machine tool castings, gear wheel blanks, Colliery castings and General Engineering castings. The problem here was to find a suitable Shot Blast Machine to clean castings from one pound to two tons at lowest total cost and to speed production.

for **ALLOY STEEL & IRON CO · CHESTERFIELD & SHEFFIELD**

THE SOLUTION . . .

After seeing the Pangborn LK 6ft. Rotablast at the 1958 Foundry Exhibition they decided to instal this machine to replace an Airless Rotary Barrel which was limited to size and weight of castings it was able to clean.



THE RESULTS . . .

1 Machine easily installed.
2 No Foundations required.
3 All Castings produced are now cleaned by machine.
4 50 per cent. increase in Output is now cleaned by same number of operatives.
5 No Breakages of Thin Castings.
6 Considerable saving of shot.
7 Fettling keeps pace with output.
8 Perfectly clean Castings to customers on time.

Blasting time three minutes

HEPBURN CONVEYOR Co. Ltd.

Telegrams: CONVEYORS
Tel. Nos. 3695/6 & 7
WAKEFIELD, Yorks.

Fifteenth century carving in St. Leonard's Church, Ribbesford, of a pig playing the bagpipes, with a sow and litter, and two pigs reaching for acorns. Photograph by Ruth Meyler & F. C. Sillar

50 MILLION PIGS GO TO MARKET!

In the early days of the industrial revolution manufacturers frequently looked for familiar and easily recognisable descriptions of their products. To the countryman transplanted into industrial surroundings nothing was more familiar than a pig; a fact which is emphasised by carvings in scores of old churches depicting pigs suckling their litter, rooting for acorns and playing the bagpipes. (Apparently this last pastime was forsworn by pigs many years ago because of unpleasant associations between bagpipes and pigs bladders.) Consequently, when iron from Blast Furnaces was directed into long troughs and from there into short and narrow troughs placed at right angles, a resemblance to sows suckling their appendaged litter led to the description of 'pig iron'.

This series of advertisements illustrates some of the 'ecclesiastical' pigs and emphasises the 50,000,000 'special' pigs which Warner and Company have supplied to Iron Foundries producing High Duty Castings.

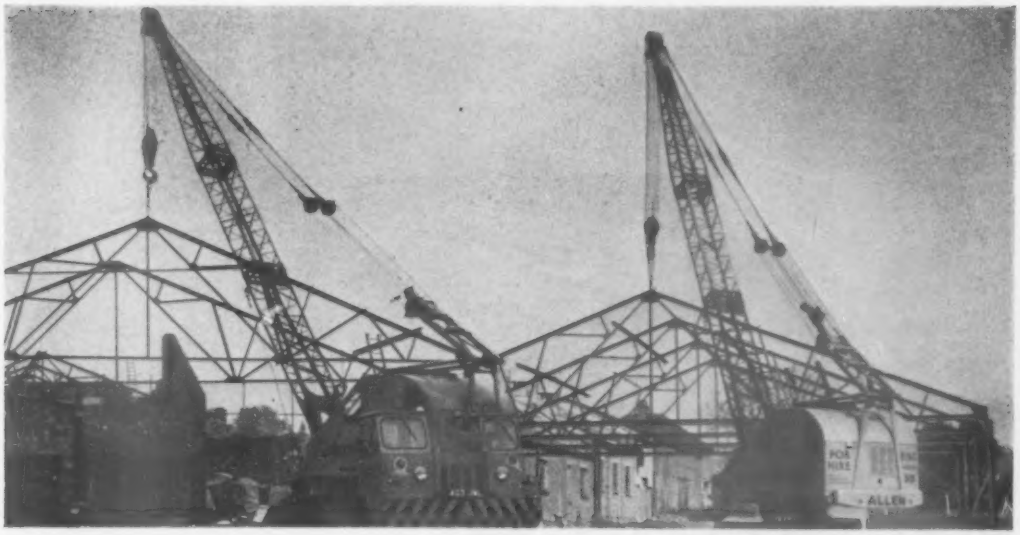
WARNER WARNER WARNER

"Pioneers of Refined Pigiron"

KA WARNER & CO. LTD., MIDDLESBROUGH

Core and synthetic moulding sands
BIS
CO_2 Sands
Feslente resin-coated sands
Technical data sheets sent on request
BIS
BRITISH INDUSTRIAL SAND LTD
HOLMETHORPE · REDHILL · SURREY
Telephone: REDHILL 1122

WE ALSO HAVE SPACE PROBLEMS!

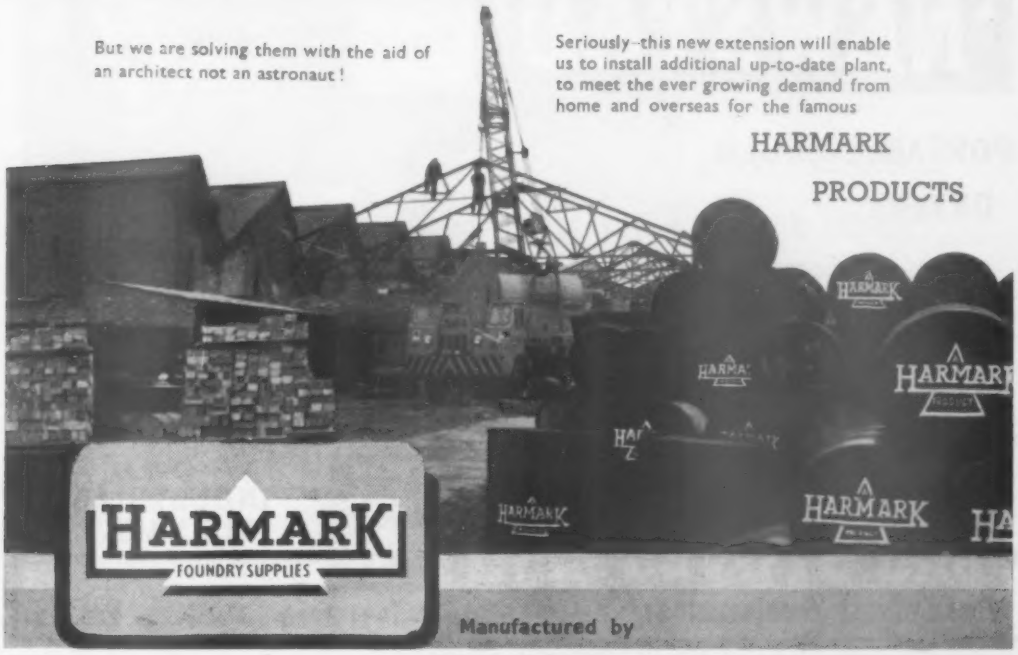


But we are solving them with the aid of an architect not an astronaut!

Seriously—this new extension will enable us to install additional up-to-date plant, to meet the ever growing demand from home and overseas for the famous

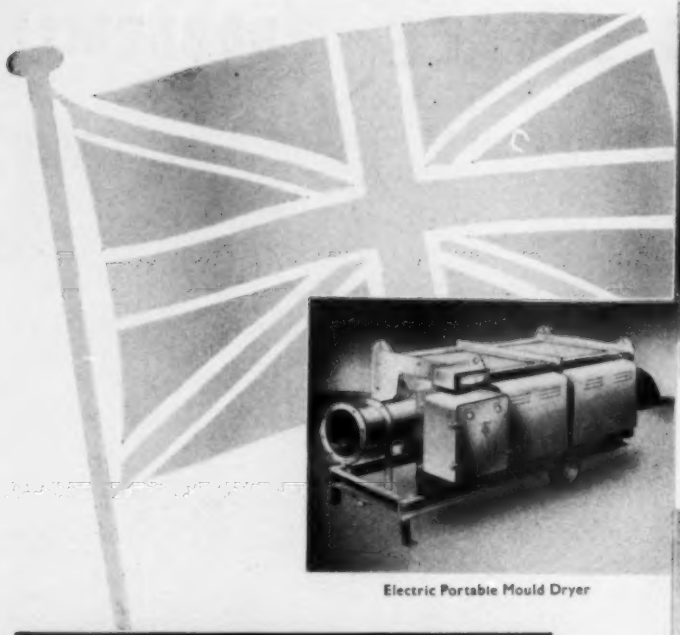
HARMARK

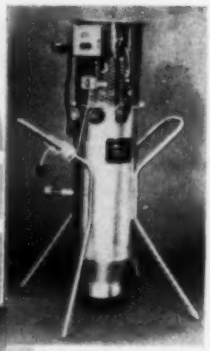
PRODUCTS



Manufactured by

HARBOROUGH CONSTRUCTION CO·LTD·MARKET HARBOROUGH





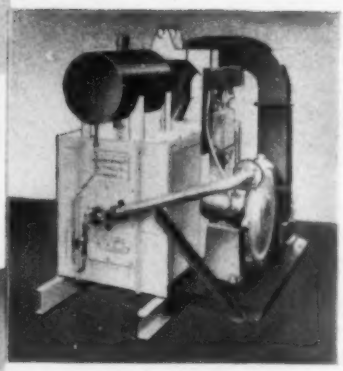
Axial Jet M Gas Fired

Electric Portable Mould Dryer

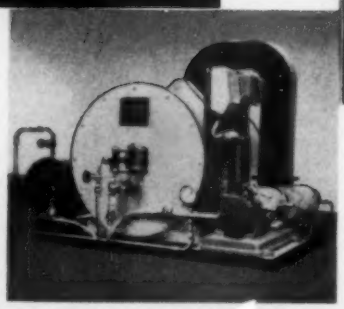
'NEWSTAD'

PORTABLE MOULD DRYERS

—for Economy
—Efficiency
—Reliability



"Newstad" Oil Fired



"Junior" Oil Fired

Manufactured only by the Foundry Drying Equipment Specialists

MODERN FURNACES and STOVES LIMITED

Builders of INDUSTRIAL FURNACES

BOOTH STREET, BIRMINGHAM 21. phone: SMEthwick 1591-2 grams: Mofustolim, B'ham 21

OVERSEAS AGENTS

Drew Brown Limited, 5410 Ferrier Street, Montreal, 9. Canada.
Fenter (Africa) (Pty), Ltd., P. O. Box 6738, Johannesburg, South Africa.

8/219

Whatever their HORSE power, engines purr like PUSSIES when their castings have been cored with Sternocore sand binders—they will go on doing this for DONKEY'S years. Sternocore products* can be equally trusted to give the same harmonious results till the COWS come home!

* *We won't bother you with the technical "gen" here, but just say the word and we will have a representative round with the milk in the morning.*

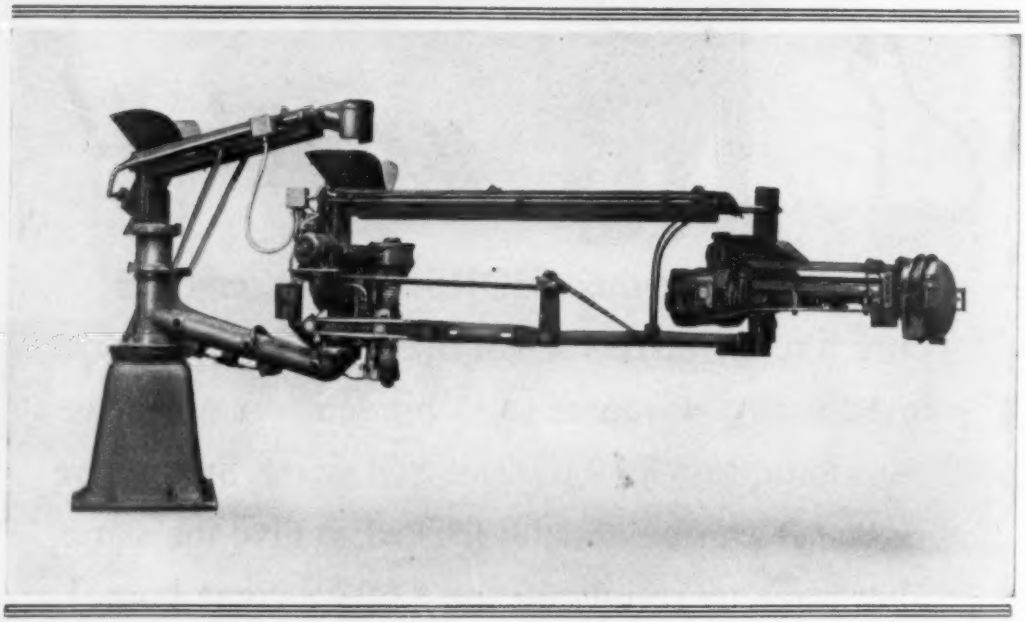
STERNOL Oils

PLEASE HELP SPASTICS

STERNOL LTD., ROYAL LONDON HOUSE
FINSBURY SQUARE, LONDON E.C.2. Telephone: MONarch 3871-5

Sandslinger

AT DURGAPUR



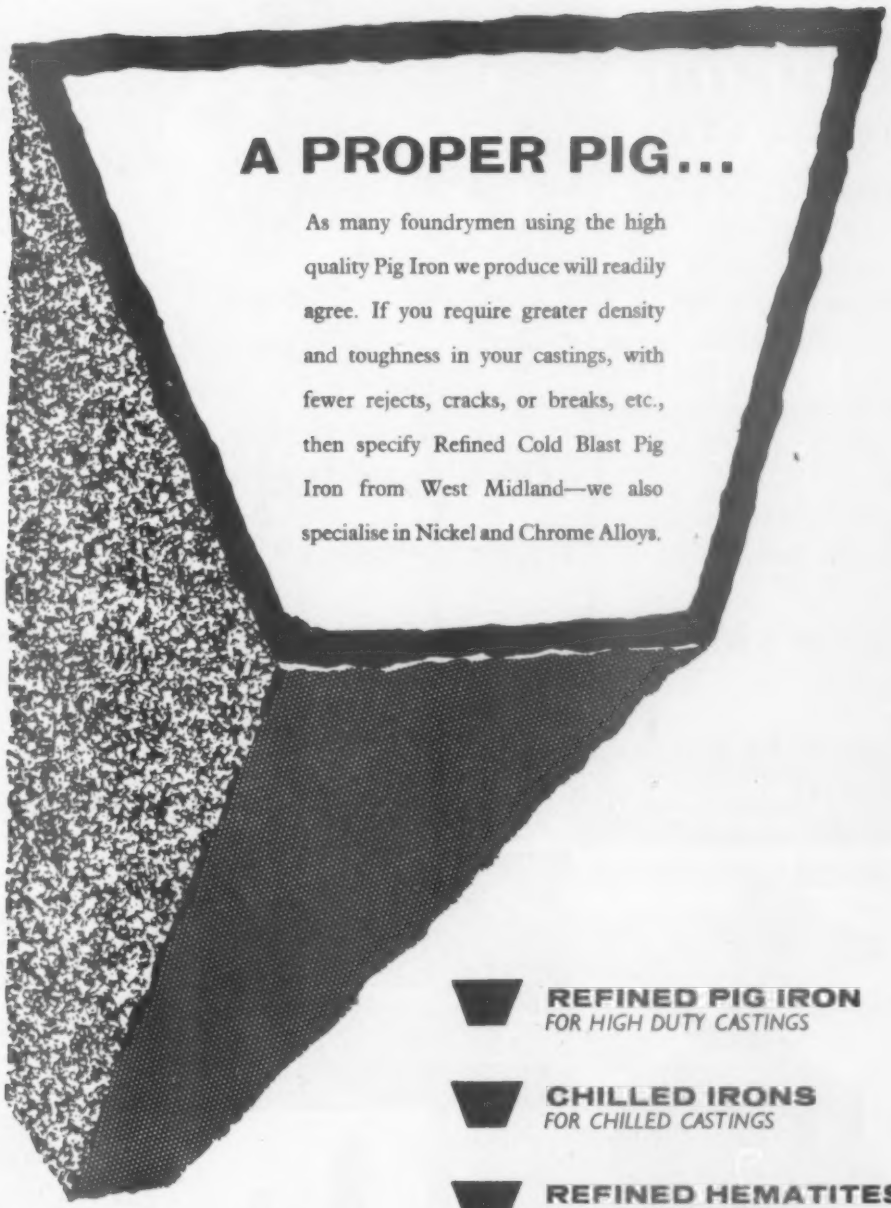
We are privileged to have supplied the SANDSLINGERS to the Iron and Steel Foundry. Illustrated above is the 3 part arm Stationary Type Machine for the production of ingot moulds.

FOUNDRY PLANT & MACHINERY LTD.

EGLINTON WORKS, COOK STREET, GLASGOW C.5. SCOTLAND

Telephone: SOUTH 2283

Telegrams: SANSLINGER, GLASGOW C.5



A PROPER PIG...

As many foundrymen using the high quality Pig Iron we produce will readily agree. If you require greater density and toughness in your castings, with fewer rejects, cracks, or breaks, etc., then specify Refined Cold Blast Pig Iron from West Midland—we also specialise in Nickel and Chrome Alloys.

REFINED PIG IRON
FOR HIGH DUTY CASTINGS

CHILLED IRONS
FOR CHILLED CASTINGS

REFINED HEMATITES
FOR MALLEABLE CASTINGS

WEST MIDLAND REFINING CO. LTD.
MILLFIELDS ROAD · BILSTON Tel 41069

WILLIAM CUMMING & CO. LTD.

KELVINVALE MILLS
GLASGOW N.W.

•

SUNNYSIDE MILLS
FALKIRK

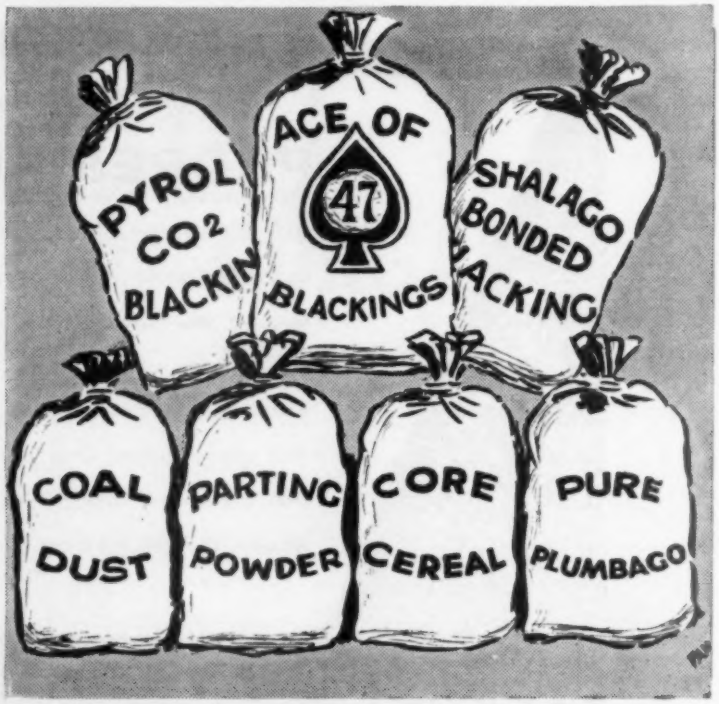
•

WHITTINGTON MILLS
CHESTERFIELD

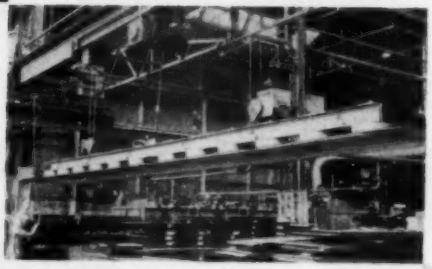
•

DEEPFIELDS WORKS
near BILSTON

FREE TRIALS



Burnand *Phoenix Lifting magnets*

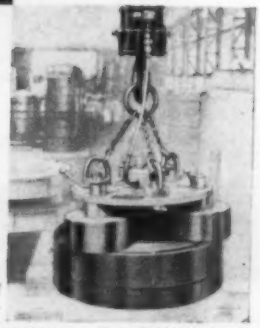


The Phoenix range includes circular, rectangular and bipolar magnets. A competent design staff will be pleased to advise on special applications.

Photograph by courtesy of Rubery Owen & Co. Ltd.

Photograph by courtesy of Staveley Iron & Chemical Co. Ltd.

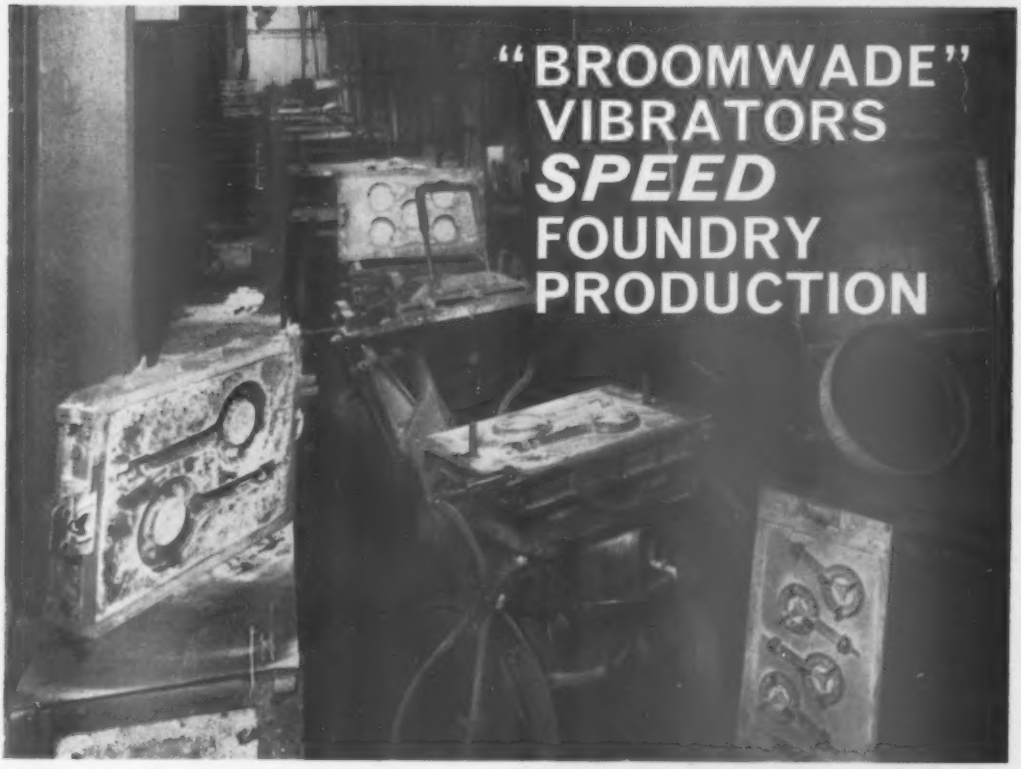
Magnets available on hire for long or short term.



Photograph by courtesy of C.M. Supplies Ltd.

All makes of lifting magnets repaired, rewound and overhauled.

W. E. BURNAND & SON, LTD., DUO WORKS, SHOREHAM STREET, SHEFFIELD. Tel.: 24148 (3 lines)



BX78V Vibrators in operation.

"BROOMWADE" manufacture two vibrators which are essential in up-to-date foundries.

The BX78V which is fitted with a special nose for vibrating plate moulds, has met with considerable success in many leading foundries.

The V1 is a high frequency vibrator which can be bolted direct to sand chutes, etc. The very simple valveless design ensures long trouble-free service under all conditions with minimum maintenance costs.

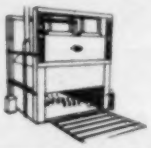
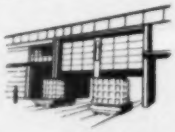
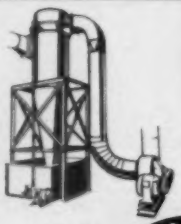
Write to-day for publication
No. 437 T.E. giving full details.

"BROOMWADE"

AIR COMPRESSORS AND PNEUMATIC TOOLS. Your best investment

Broom & Wade Ltd., P.O. Box No. 7, High Wycombe, Bucks. *Tel: High Wycombe 1630 (10 lines)*
Telex.: 83-127.

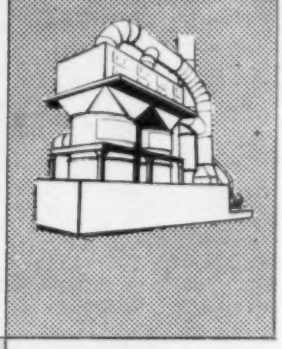
887 SAS

CHAL OVENS

For cores & moulds

Bulletin 5



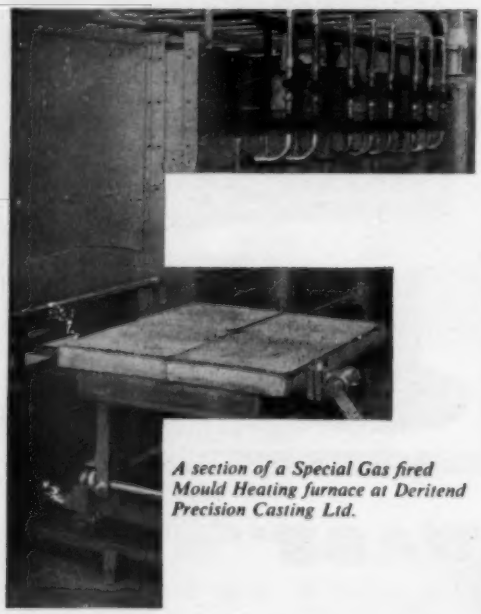
CONTROLLED HEAT & AIR LTD. SMETHWICK · ENGLAND CHAL

CONTROLLED HEAT & AIR LTD.

Smethwick England

Telephone: Smethwick 1805

5/41C/61



A section of a Special Gas fired Mould Heating furnace at Deritend Precision Casting Ltd.

FRANKLIN FURNACES

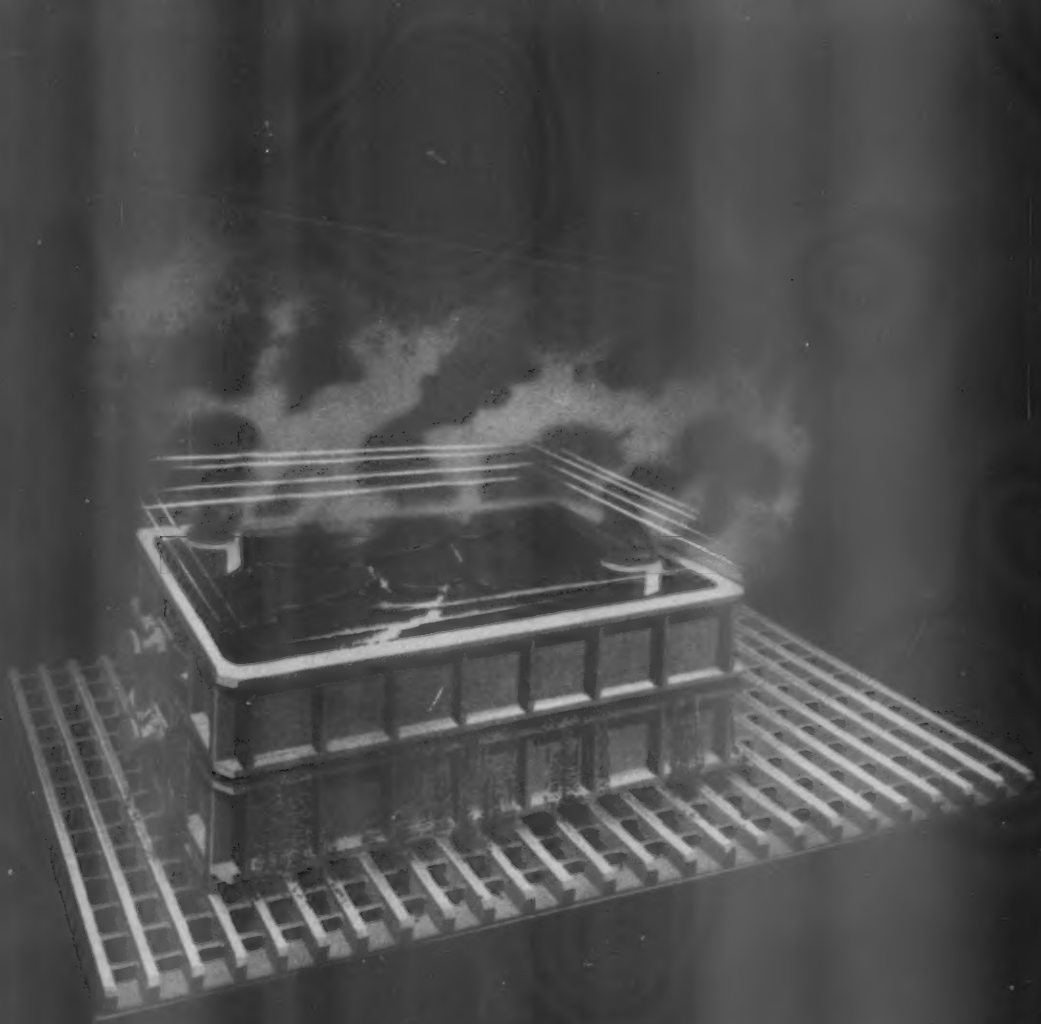
There's big savings in terms of dependability and easy maintenance when Franklin are called in on that furnace installation. Long experience in the supply of standard, and the design of special furnaces mean the snags are quickly ironed out. Furnaces fired by 'Dine' Burners give easy maintenance and fuel economy, that's why more and more well-known Companies are now counted as customers.

Our team of experts would welcome the chance to look into your furnace problems.

FRANKLIN

MANUFACTURERS OF INDUSTRIAL FURNACES AND OIL BURNING EQUIPMENT FOR ALL PURPOSES

FRANKLIN FURNACE CO. LTD., BAKER STREET, SPARKHILL, BIRMINGHAM 11, ENGLAND



Sterling

MOULDING BOXES & SHAKE-OUT MACHINES

In use in more than 9000 foundries throughout the world

STERLING FOUNDRY SPECIALTIES LIMITED, BEDFORD, ENGLAND

P.T.O

Sterling

MOULDING BOXES

for very large and heavy work and for special applications

The two boxes (above and right) were part of two large orders for use on two semi-automatic plants in different foundries. Note the wide flanges giving great strength to resist high moulding pressures. The edges of the flanges are machined accurately in relation to the pin centres to provide accurate location against stops on the machines. The flanges are also machined underneath to provide roller paths.

The box below is 5 ft. 6 in. by 27 ft. 0 in. by 30 in., for dry sand work in a very large steel foundry. Note the heavy loop handles for crane lifting and also the semi-circular pieces on the sides to allow the box to be rolled over on the floor. The lugs at the far end of the box have slots.

STERLING FOUNDRY
SPECIALTIES LIMITED
BEDFORD, ENGLAND

6/59 Copmt

For the right proportions...

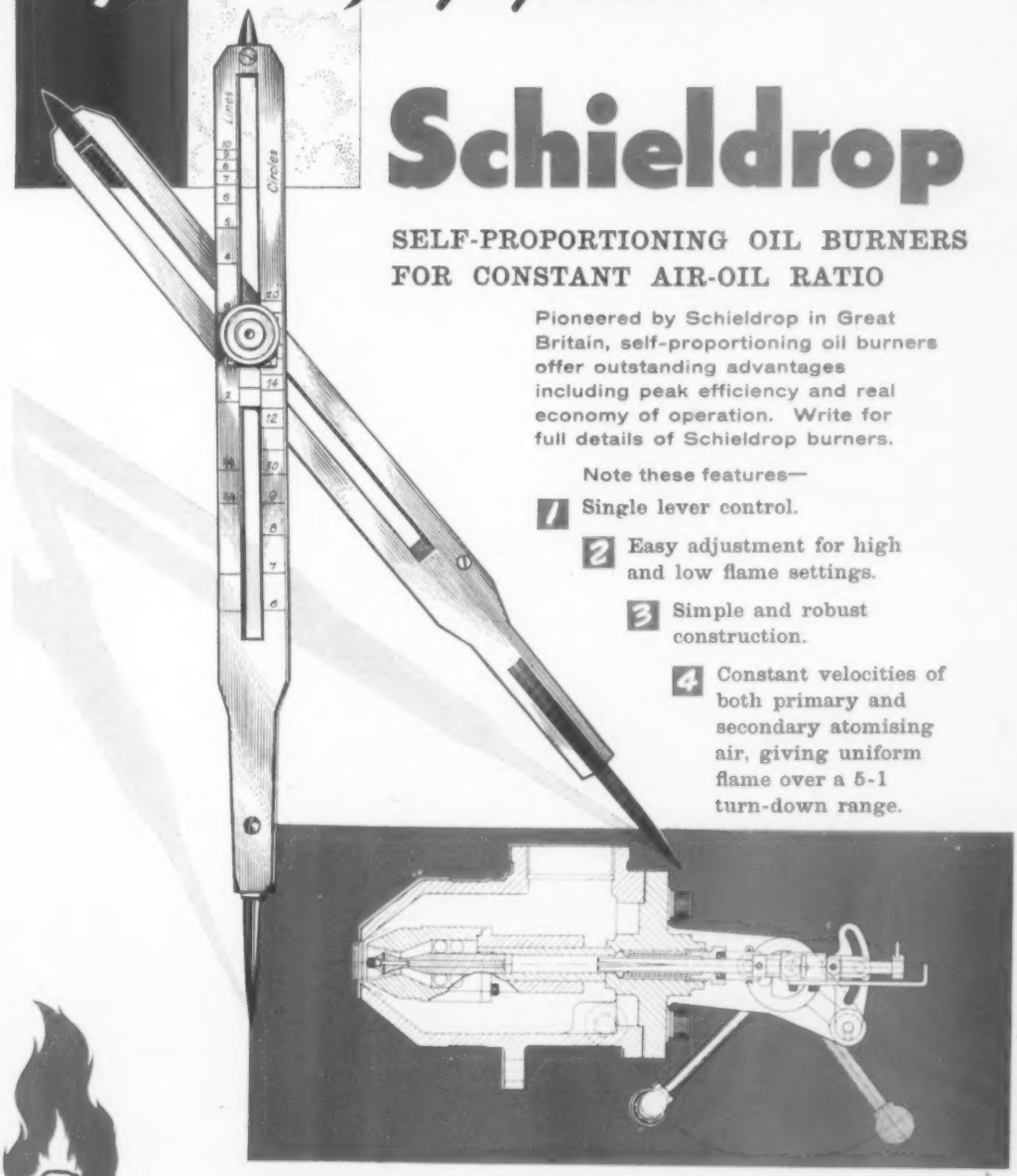
Schieldrop

SELF-PROPORTIONING OIL BURNERS FOR CONSTANT AIR-OIL RATIO

Pioneered by Schieldrop in Great Britain, self-proportioning oil burners offer outstanding advantages including peak efficiency and real economy of operation. Write for full details of Schieldrop burners.

Note these features—

1. Single lever control.
2. Easy adjustment for high and low flame settings.
3. Simple and robust construction.
4. Constant velocities of both primary and secondary atomising air, giving uniform flame over a 5-1 turn-down range.



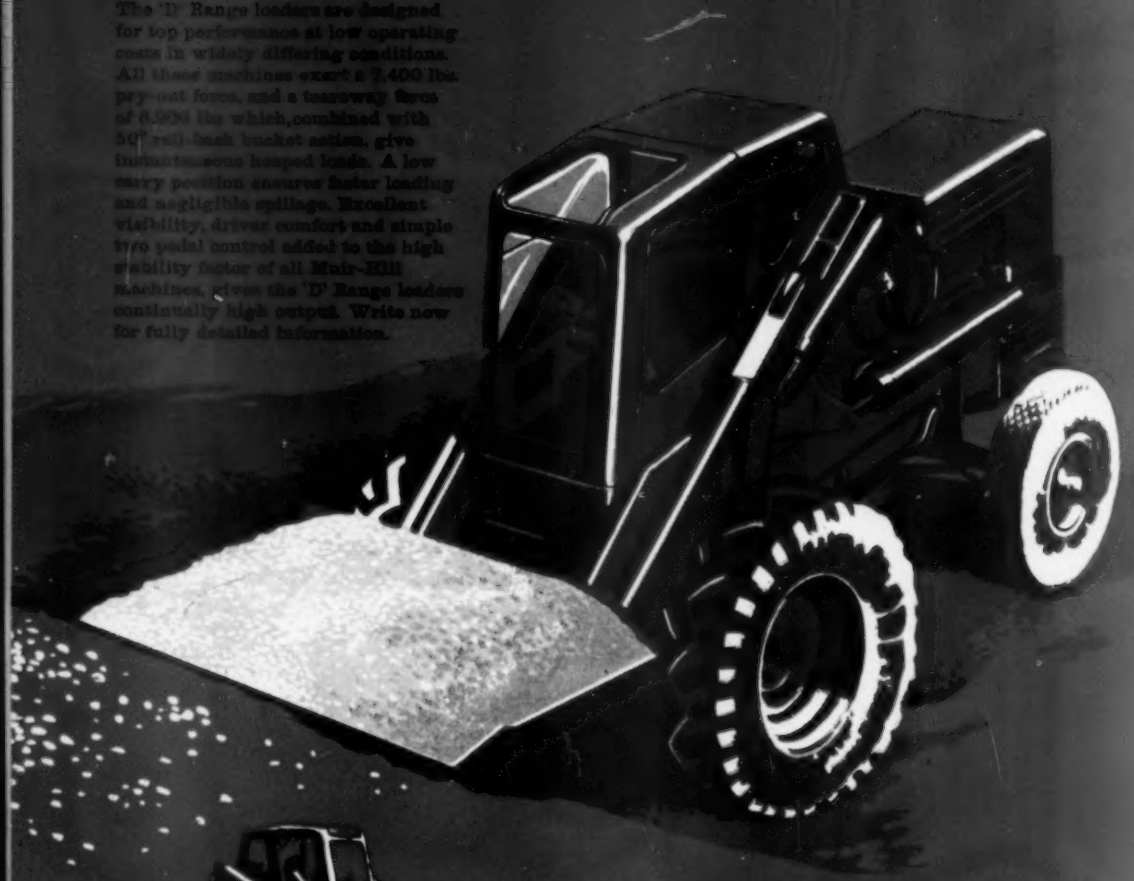
Schieldrop & COMPANY LIMITED

STOTFOLD, BEDS. Phone 414 (4 lines)

THE Muir-Hill "D" RANGE

for every type of duty

The 'D' Range loaders are designed for top performance at low operating costs in widely differing conditions. All these machines exert a 7,400 lbs. pry-out force, and a tearaway force of 6,600 lbs which, combined with 50° roll-back bucket action, give instantaneous heaped loads. A low carry position ensures faster loading and negligible spillage. Excellent visibility, driver comfort and simple two pedal control added to the high stability factor of all Muir-Hill machines, gives the 'D' Range loaders continually high output. Write now for fully detailed information.



ABOVE: RD3 Front wheel drive loader for stockpile and downhill working.
LEFT: RD4 Four wheel drive loader for adverse ground conditions.
BELOW: RD3 Rear wheel drive loader, a versatile general purpose machine.

5 INTERCHANGEABLE BUCKETS

Muir-Hill
Regd.
BUILT BY BOYDELL

E. BOYDELL & CO LTD
Telegrams: Muirhil, Manchester, 16.
CRESCENT WORKS, OLD TRAFFORD, MANCHESTER, 16
Telephone: TRAFFORD [illegible] 1641

ROWLAND *New*

14in. MOTOR DRIVEN DOUBLE ENDED

GRINDING MACHINES

ALL-STEEL CONSTRUCTION

POWERFUL - RIGID - FAST

AMPLE ROOM FOR TWO OPERATORS

TYPE 'FSS' This highly efficient dry grinder has been especially designed for the rapid fettling of smaller castings as well as for general work. All steel construction provides exceptional rigidity. Precision angular contact ball bearing spindle sealed for long life.

DUST EXTRACTION complies in all respects with the latest Government Regulation 1, of the Grinding of Metals (Miscellaneous Industries) and Regulation 7, para. 6, of the Iron & Steel Foundries Regulation, 1953, when the machine is used with a suitable dust collection unit. *Full details are given in our new brochure. Write for your copy—today.*

TYPE 'FST'
DOUBLE WHEEL WET TOOL GRINDER FOR HIGH SPEED STEEL TOOLS, ETC

TYPE 'FSC'
COMBINED WET & DRY GRINDER FOR WET TOOL & GENERAL GRINDING

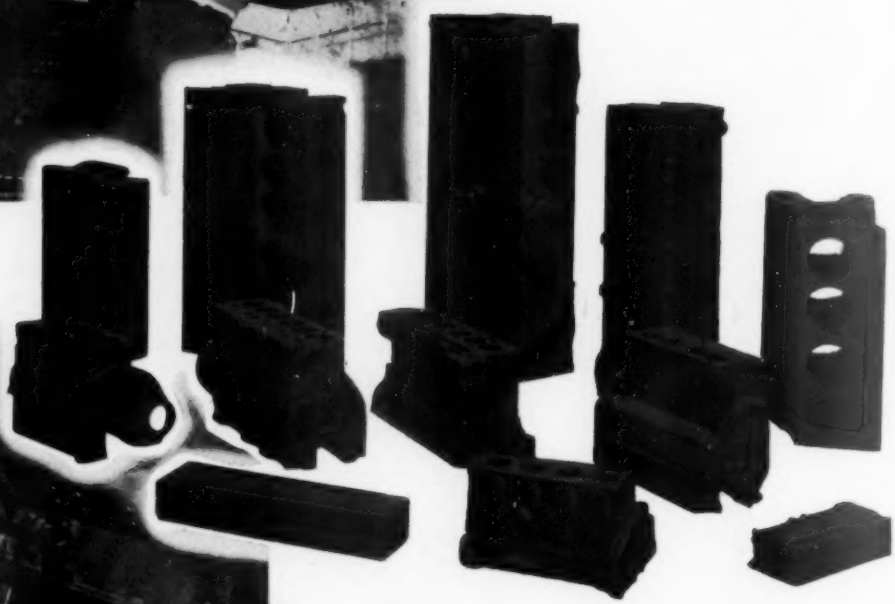
EARLY DELIVERY

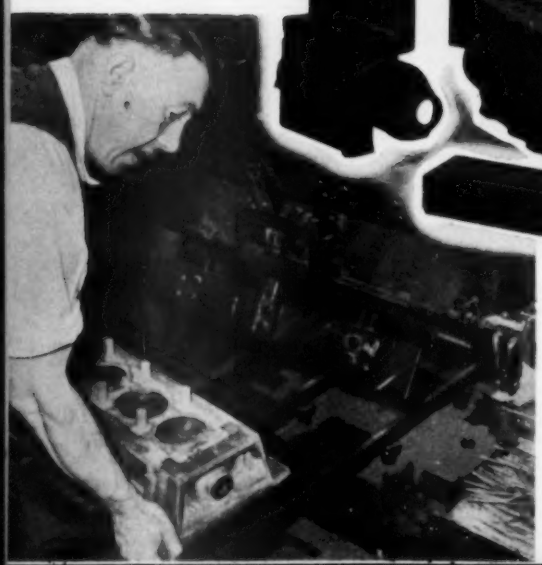
F. E. ROWLAND & CO. LTD.
REDDISH, NEAR STOCKPORT
TELEPHONE: HEATON MOOR 3201/2/3
TELEGRAMS: HEROIC, REDDISH

BEANS INDUSTRIES LIMITED

(A Division of the Standard-Triumph International Limited)

Beans Industries Limited, specialists in the casting of Cylinder and High Duty Grey Iron Castings.





Illustrations show part of the highly mechanised production foundry for which Foundry Equipment Ltd. have been privileged to supply a wide range of plant. ***(Sand Plant Moulding Units, Mould Conveyors etc., were all designed and made by Foundry Equipment Ltd.)***

FOUNDRY EQUIPMENT

LIMITED

Leighton Buzzard, Bedfordshire, England

Telephone: Leighton Buzzard 2441 (5 lines) Telegrams: "Equipment," Leighton Buzzard, England

specify FE FOR FOUNDRY EFFICIENCY **PLANT & EQUIPMENT**

TRADE MARK

F. E. Ltd. plant and equipment is used for the production of a complete range of all castings in all shapes and sizes.

Photographs by Courtesy of Beans Industries Ltd., Tipton, Staffordshire

OVERSEAS COMPANIES:
AUSTRALIA: Foundry Equipment (Australia) Pty. Ltd., Elizabeth, S. Australia.
CANADA: F. E. (North America) Ltd., Toronto.
SOUTH AFRICA: F. E. (South Africa) (Pty) Ltd., Johannesburg.
SPAIN: "Foundry Equipment" Comercial Espanola, S.A., Madrid.
U.S.A.: FECO Inc. Port Washington, N.Y.

AGENTS IN ALL INDUSTRIAL COUNTRIES

FE FOR FOUNDRY EFFICIENCY
TRADE MARK

Beans Industries Ltd.

The well known producers of high duty grey iron castings

USE BQ Automatic Machines

in their mechanised foundries at Tipton Staffs.

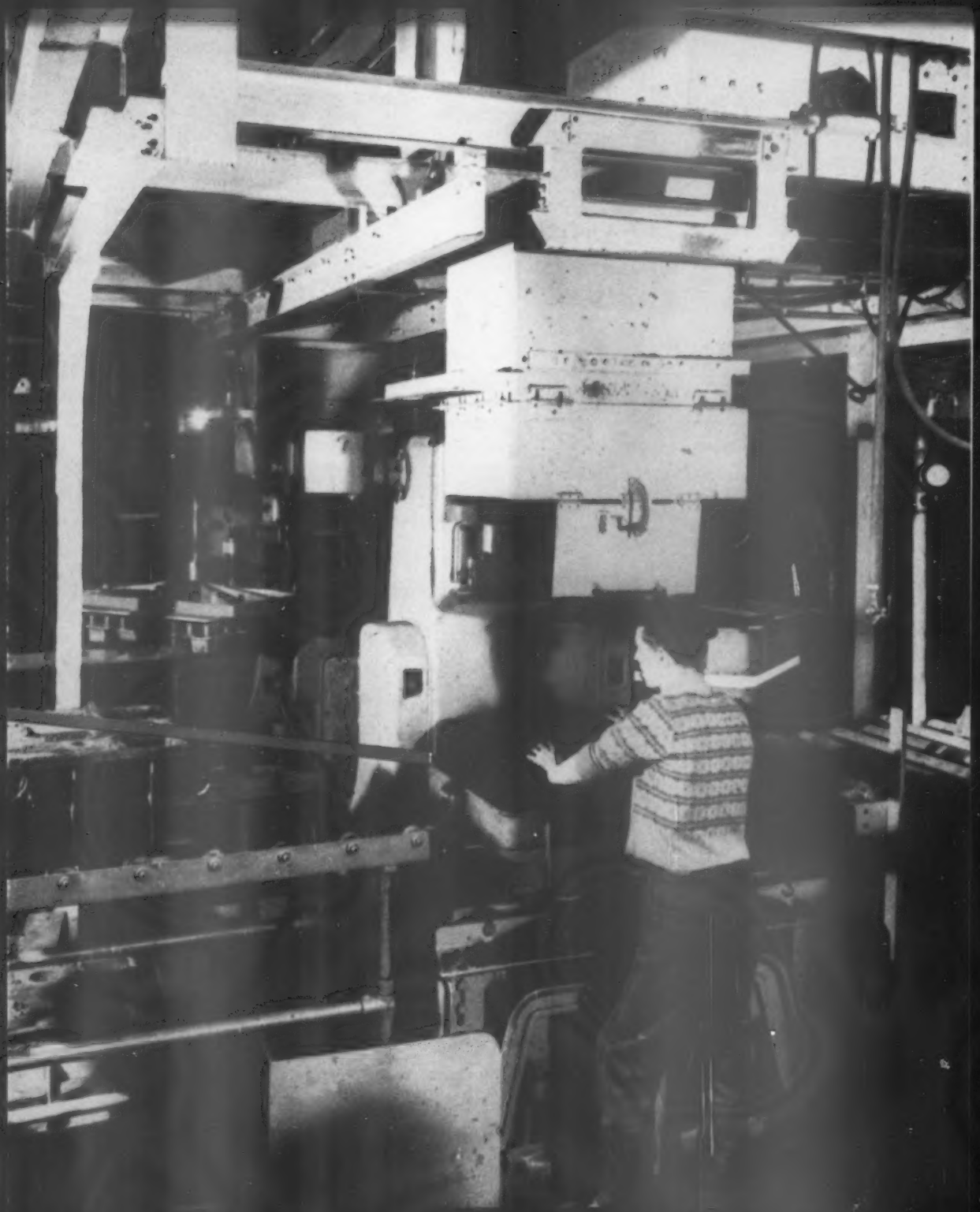
B.Q.3 and B.Q.5 machines are making their contribution to the production of clean, dimensionally accurate castings in this famous foundry by providing clean, hard and accurate moulds.

B.Q. machines are available in 3 sizes and various types of pattern draw.

MAY WE SEND YOU DETAILS?

BRITISH MOULDING MACHINE CO. LTD.

Telephone: FAVERSHAM 2246/7/8



WESTON WORKS - FAVERSHAM - KENT

Telegrams: EASIRAM, FAVERSHAM

For X-ray quality cleanliness

. . . steel castings need the finest refractories.

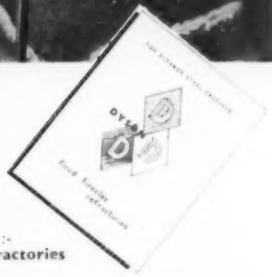
Choose your DOWNGATES and INGATES and Rod Covers, Stoppers, Nozzles and Ladle Lining Tiles from the Dyson catalogue "Fired Fireclay Refractories".

Photograph by courtesy of Samuel Osborn & Co. Limited

Your refractories can be delivered to your works, **anywhere in Britain, within 24 hours.**

. . . or sooner in case of emergency

Dyson for *much* quicker service.



Send for our brochure :-
Fired Fireclay Refractories

D

J. & J. DYSON LIMITED

STANNINGTON, SHEFFIELD.
Telephone : SHEFFIELD 348663.

FOUNDRY TRADE JOURNAL

Vol. 111 August 3, 1961 No. 2330

Established 1902

Incorporating

IRON & STEEL TRADES JOURNAL

Published each Thursday

Annual subscription: *United Kingdom* 52*s.*
Abroad 60*s.* *Payable in advance*

Editorial Director:
V. C. FAULKNER, F.R.S.A., HON.M.I.B.F.

Editor:
A. R. PARKES, M.I.B.F.

Commercial Editor:
R. M. HOWSE

Production Manager
R. J. LOVELL

Publisher:
H. J. DWYER

Circulation Manager:
E. T. GRIFFITHS

District Representatives:
G. P. ELLIOTT (Northern Area) 'phone: Altrincham 1334
T. H. SMITH (Scotland) 'phone: Dumbarton 1046
D. C. RYALL (Southern Area) 'phone: TRAfalgar 6171

The FOUNDRY TRADE JOURNAL is the official organ of the British Steel Founders' Association; Association of Bronze & Brass Founders; the Light Metal Founders Association; Foundry Trades' Equipment & Supplies Association; and the National Society of Master Patternmakers.

AN INDUSTRIAL NEWSPAPERS PUBLICATION

Published by
INDUSTRIAL NEWSPAPERS (FUEL & METALLURGICAL) LTD.

Directors:
F. BARRINGTON HOOPER, B.A., *Managing*
F. H. HARLEY
JOHN HOOPER
V. C. FAULKNER
E. G. WESTON, *Secretary*

JOHN ADAM HOUSE,
17-19, JOHN ADAM STREET,
ADELPHI, LONDON, W.C.2

Telephone: Trafalgar 6171 (*Private Branch Exchange*)
Telegraphic Address: "Zacatecas, Rand, London."

PRINCIPAL CONTENTS

PAGE

British Steel Castings Research Association

Abstracts from the annual report, April 1, 1960, to March 31, 1961, and annual general meeting proceedings 127

Vienna Congress Papers, I

Summaries of papers presented at the International Foundry Congress held in Vienna, June 19 to 24 133

Dynamic Accountancy

By E. A. Ede, F.A.C.C.A., F.C.W.A., A.C.I.S.

Application of accounting methods to the control and development of the productive process 139

British Steel Castings Research Association: rapport annuel du 1er avril 1960 au 31 mars 1961. 127

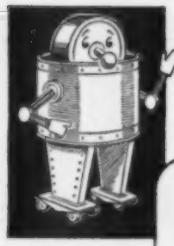
Journal de Vienne. Par A. R. Parkes. Rapport à ligne directe du procès-verbal du Congrès International de Fonderie, tenu à Vienne du 19 au 24 juin. 133

British Steel Castings Research Association: Jahresbericht vom 1.April 1960 bis 31.März 1961. 127

Wiener Tagebuch. Von A. R. Parkes. Ein Bericht aus erster Hand über die Sitzungen während des Internationalen Giessereikongresses, welcher in Wien vom 19. bis 24. Juni stattfand. 133

Features, News, Commercial Information, and Statistics

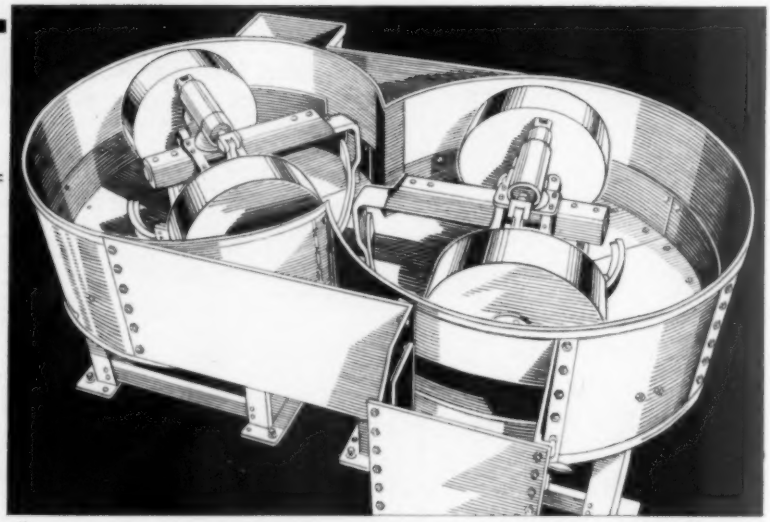
Leader: Why Firms fail to Export 125
International Foundry Congress and Exhibition, 1962 126
Correspondence: Iron and Steel Board Report and the Founding Industry 126
Apprentices complete Course at Government Training Centre 126
New French Foundry School 126
Latest Foundry Statistics 126
Equipment and Supplies 145
Personal 146
Research and Development at AEI-Birlec 147
Cobalt-Chromium Alloy for Dentistry 147
Wellworthy buys Wilmot Breeden Properties 147
Notes from the Branches 149
News in Brief 151
Raw Material Markets 153
Current Prices of Iron, Steel, and Non-ferrous Metals 154
New Patents 155
Company News 156
Translation Services 156
Publications Received 157
Catalogues 158



First in the Field - again!

WITH THE

AUGUST-SIMPSON MULTI-MULL CONTINUOUS MULLER



HERE ARE ITS ADVANTAGES

High volume output in small space.

Low original cost, no mill hoppers or belts—batch accumulating or measuring equipment needed.

More production for every pound invested in mixing equipment.

Proved mulling principle.

August-Simpson quality guarantee.

Top quality system sand.

Maximum controllability.

An entirely new concept in sand preparation.

HERE'S HOW IT WORKS:—

In the Multi-Mull, system sand is subjected to the same intensive equalising or averaging action found in an August-Simpson Mix-Muller.' Because of this DIVIDE and MIX principle, it is practically impossible for sand to pass through the mixing process without being subjected to at least two complete passes through each mixer.

It has been designed to (1) Provide a continuous high hourly rate of production on system moulding sands; (2) Turn out sand that approaches the quality and controllability of sand produced in a batch muller.

The Multi-Mull is designed for use in foundry sand preparing systems where a relatively short batch cycle would be satisfactory. For further details contact August's.

Sole Licensees and Manufacturers for the British Empire (excluding Canada, Australia and New Zealand) of the Simpson Sand Mixer

HALIFAX ENGLAND

August's LIMITED

TELEPHONE: HALIFAX 61245/6/7/8

TELEGRAMS: AUGUST, HALIFAX

FOUNDRY
TRADE JOURNAL
Vol. 111 August 3, 1961 No. 2330

Why Firms fail to Export

Under the heading "British Manufacturers and the Export Drive," the "Export Action Now" Committee of the Institute of Directors (10, Belgrave Square, London, S.W.1) has issued an important and somewhat disquieting report on the current situation. It was based on a survey made by a firm of consultants who restricted their inquiries to 52 firms employing fewer than 300 workpeople, as this was deemed to be the best field to exploit for increased exports. Basically, the result was that the exports of about 50 per cent. were declining or stationary at a low level and just under 25 per cent. had not exported and were not interested in doing so. Fewer than 10 per cent. of the non-exporting firms expressed a desire to export, but were at a loss to know how to start. About 25 per cent. of the firms surveyed were exporting vigorously.

Here it is of interest to point out that the exporting firms were of the opinion that it was easy to obtain export information; that the Board of Trade was helpful, and that lack of knowledge of foreign languages was no real barrier. One direction in which the Board of Trade can help is the organization of group stands at a cheap rate for overseas exhibitions. It must be confessed that of the reasons given by the non-exporting firms, many were unworthy of such an appellation as they were mere excuses covering lack of interest. They include such attitudes as confessed ignorance of Government help, taxation worries and the complexity and quantity of the necessary forms. One reason, which may apply very pertinently with foundry firms, is "We only make components." It is true that in many cases finished products for which founders supply components are in fact exported. Thus, it is cheering to read that some of these firms have succeeded in foundry markets and have regular customers overseas, whilst others have developed new products which are more readily exportable.

Perhaps the most insidious of all reasons given for making no attempt to export can be paraphrased as reading "I am batting on the home-market wicket and doing so well that I do not propose to risk a sporting 'declaration'." This is exemplified by a statement from the chairman of a prominent foundry-supply firm, who so far has failed to interest his manager in exports because this would mean that the manager would have to get out of his very comfortable rut. It would appear that many small manufacturers will need a trade depression to arouse them from their lethargy. Unfortunately, at that time their excuse will probably be "no money available for sales-promotion efforts."

International Foundry Congress and Exhibition 1962

A major step to ensure the smooth running of the exhibition to be staged concurrently with next year's International Foundry Congress was taken recently in Detroit when representatives of the City, of the large new Cobo Hall exhibition building, all major labour unions involved and the American Foundrymen's Society jointly signed an agreement covering a set of basic ground rules for installing, dismantling and operating of such shows. The extensive basic ground rules have been accepted by all parties concerned and it is stated, represent a major "break-through" for the more efficient operation of American industrial exhibitions, being designed to establish indisputable authority and responsibility for all services and costs. Claimed to be one of the finest exhibition halls in the world, Detroit's Cobo Hall thus becomes the first major show organization in the country to reach complete agreement on basic issues essential to successful shows and expositions.

The ground rules automatically become a part of the contract between Cobo Hall and the American Foundrymen's Society for its giant exhibition scheduled for Cobo Hall from May 7 to 11, 1962. It will be the largest industrial exposition yet for the new hall and will be the first time in 10 years that the International Foundry Congress, with world-wide attendance of foundrymen, will be held in this country.

A copy of the rules has been lodged with the Editor of the JOURNAL and is available for inspection by readers who are interested.

Correspondence

To the Editor of the FOUNDRY TRADE JOURNAL

IRON AND STEEL BOARD REPORT AND THE FOUNDING INDUSTRY

SIR,—In your Editorial under the above title in the issue of June 29, referring to the Annual Report of the Iron and Steel Board for 1960, you state that "The Report comments on the £350,000 spent by the British Cast Iron Research Association."

I am sure that there has been some error in interpreting the figures mentioned in the Report and that you would like to make this clear to your readers. The Report actually stated that the ironfounding industry spent about £550,000 in the year 1958-59 on research. It is presumed that this figure is intended to cover the research expenditure by the industry in its own premises, in addition to that at the British Cast Iron Research Association.

The actual expenditure of the Research Association during the year 1958-59 was, in fact, only £190,000 on revenue items, and there was an exceptional, non-recurring capital expenditure of £75,000. This gives a total expenditure far lower than the £350,000 mentioned in your Journal.—Yours, etc.,

H. MORROGH,
Director

British Cast Iron Research Association,
Bordesley Hall,
Alvechurch, Birmingham.
July 25, 1961.

[Apologies are made for the misquotation of £350,000 instead of £550,000 in the Report. Thanks are due to Mr. Morrogh for pointing this out and for analysing the expenditure—*Editor.*]

Apprentices complete Course at Government Training Centre

The first 12 boys to complete the course at the Long Eaton Government Training Centre for apprentices will leave in September. They will be the first boys to complete this form of training in the North Midland Region. The scheme was introduced by the Ministry of Labour in 1960 with the approval of both sides of industry. It is concerned to demonstrate a pattern of training capable of wide adoption by small- or medium-size firms which have not the facilities to undertake training or increase their intake of apprentices. The syllabus of the engineering course follows the recommendation of the national joint body of the Engineering and Allied Employers' Federation and the Confederation of Shipbuilding and Engineering Unions. Nominations of boys by employers is now invited by the Ministry of Labour and Youth Employment Service.

There is no charge to employers for the training but they are responsible for payment of boys' wages during training at the appropriate apprentice rate, for the employer's share of the National Insurance contribution, and for day-release fees. The Ministry pays daily travelling expenses over a certain amount, and lodging allowance for boys who cannot reach the centre daily from their homes. Tools and protective clothing are issued on loan from the centre. The boys return to their employers for the remaining four years of their apprenticeship after the course.

New French Foundry School

An additional training centre for the French foundry industry has been opened at Vierzon. It is to train foundry technicians and is well equipped. The plant installed includes a semi-automatic sand-preparing unit fed by underground conveyor from the knock-out; both squeeze- and ram-moulding machines, roller path for moulds terminating in an automatic knockout; coreshop with blowing machines and stations for CO_2 gassing; an area equipped for shell moulding; an automatically charged 2-ton per hr. cupola; a Blanchard rotating furnace for melting steel and special irons; two crucible furnaces for non-ferrous and light alloys; three control laboratories; a rotating table shotblast cabinet; ladle drying plant; and an underground stockyard where materials are weighed whilst being handled on a monorail. Thus the advantages of mechanization are inculcated into the students at the very beginning of their training. There are a number of similar schools in the various French foundry areas.

Latest Foundry Statistics

Steel Castings. The June edition of *Monthly Statistics*, published jointly by the Iron and Steel Board and the British Iron and Steel Federation, states that the average weekly production of steel castings during May was estimated at 5,900 tons, the identical estimated figure for April; for May last year the estimated figure was 6,000 tons. The 1961 totals include about 1,400 tons of alloyed steel. Employment in steel foundries on May 6 stood at 18,780, which shows a decrease of 160 compared with the April figure, but it is still exactly 1,000 greater than a year earlier.

British Steel Castings Research Association . . .

. . . Eighth Annual Report

Following are Abstracts from the Report which Covers April 1, 1960 to March 31, 1961 and Annual General Meeting Proceedings

The following extracts from the BSCRA eighth annual report cover the main activities for the period up to the end of March this year, the balance of the report lists the compositions of council and committees, discusses finance, membership, conferences, open days and publications, reviews external relations, advisory service and staff, and enumerates over 30 research and development projects currently in hand. In addition, the Associations' Special Assistance to Industry Scheme is outlined. The abstract surveys research progress during the year and sections are included on foundry processes, metallurgy, plant engineering, health, and non-destructive testing.

The second year of the Association's second quinquennium of Department of Scientific and Industrial Research grant has been characterized by consolidation, following the extensions to the experimental foundry and laboratories, which were carried out during the previous year. The installation of new plant and equipment, notably of a 56-lb. vacuum induction melting furnace, together with a small addition to both the research and administrative staff, have produced the optimum scale of effort from the available resources.

During the year, and consequent upon the resignation of the secretary, Mr. J. Bolton, a considerable reorganization has taken place in the allocation of administrative duties. The Association's external activities have shown a marked increase, which is partly attributable to the Special Assistance to Industry Scheme. The provision of these special funds has been of considerable value both to the industry and to the Association. The response by members to these and other activities has been reflected in an increased interest in the work of the Association, and participation in conferences and discussion groups.

RESEARCH

Desulphurization of Liquid Steel

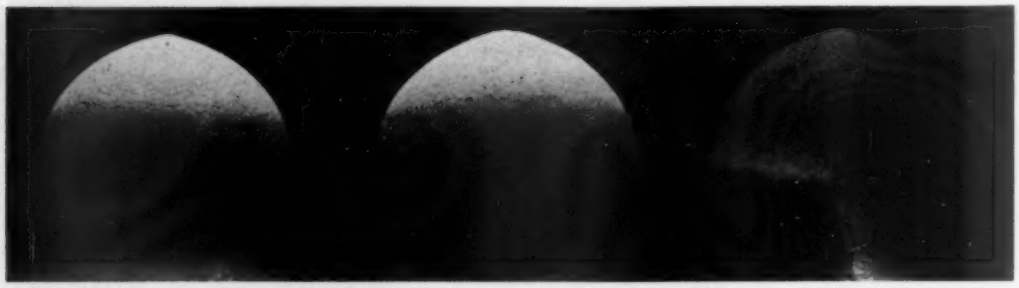
The experimental work on the reversed-slag process, working on both magnesite and dolomite hearths, has been completed, and the following conclusions have been drawn: (*a*) The rate of sulphur removal can be increased, especially at low sulphur levels, by agitating the bath by the injection of nitrogen well below the slag/metal surface and/or by dispensing suitable powdered materials in the nitrogen stream. (*b*) When working on a magnesite hearth, it is possible to produce steel with a low sulphur and a low hydrogen content by a reversed, two-slag process—that is a reducing period, followed by an oxidizing period. With a dolomite hearth, this has not been possible owing to sulphur reversion from the hearth to the metal during oxidation.

Works trials have also been carried out in a 5-ton arc furnace with a dolomite hearth. As a result of these trials, it has been found that the injection of calcium-carbide alone was not effective in promoting rapid desulphurization and that to do this required more complex powder mixes, such as calcium carbide/magnesium/fluorspar or burnt lime/magnesium/fluorspar. When using such mixes, rapid desulphurization to low sulphur levels has been obtained. As in the experimental work, it has not been possible in these trials to obtain very low sulphur levels by the application of the reversed two-slag procedure because of sulphur reversion from the hearth. It has been possible, however, to obtain steel of a low hydrogen content (approx. 2 ml per 100 gm) with sulphur contents of less than 0.02 per cent. by such a reversed two-slag procedure.

Pinhole Porosity

The severity of pinholing is now measured by a radiographic technique and, using this method, the steelmaking variables are being investigated It has been found that additions of strong deoxidizers, such as aluminium, titanium and zirconium, drastically reduce the severity of pinholing and that zirconium is the most effective in this respect. So far no relationship has been found between the severity of pinholing and atmospheric humidity. The effects of bismuth and selenium additions have also been studied, but neither of them have proved effective in eliminating pinholes.

Test castings have been made in carbon-free iron and the number of pinholes was thereby markedly reduced from the usual number of about 100 to 300 obtained with steel made to BS 1617, Grade A, down to about 10 or 20. These experiments, together with the work on deoxidants, offer further substance to the belief that the carbon/oxygen



Tests carried out by BSCRA to determine the scabbing tendencies of a moulding mix, shows the degree of cracking and spalling obtained when a sand bonded with different bentonites, is suddenly subjected to temperatures of 1,350 deg. C. (a) (left) contains 5 per cent. Wyoming bentonite; (b) (centre) 5 per cent. Mediterranean bentonite, and (c) (right) 5 per cent. calcium bentonite.

reaction is of prime importance in pinholing. Microscopic and radiographic examination of mould pour-out (slush) castings showed that the growth of the pinholes is preceded by the formation of fine capillary tubes at the mould/metal interface which apparently act as nuclei for the pinholes.

Methods for artificially increasing the hydrogen and nitrogen content of the steel have been developed. Work is proceeding to study the effect of these on the severity of pinholing, both in the presence and absence of carbon, a start has also been made on the study of the effect of the moulding material variables on pinholing.

Foundry Processes and Moulding Materials

Surface Quality of Steel Castings

Mould Paints and Washes.—Further attention has been paid to the formulation of water-based zircon mould washes. In a number of member-foundries, the recommended alginate-suspended washes are being used very satisfactorily while in others some modifications have been made to suit individual needs. One difficulty encountered during the foundry trials has been the limited bench-life of the alginate paint mix, and while this does not detract from its usefulness when prepared in the foundry using suitable mixing equipment, it becomes a serious disadvantage when the paint is prepared commercially.

Work has shown that in order to prevent metal penetration under high ferrostatic heads, a comparatively thick coating of paint must be applied on to the sand surface. Since this involves at least three successive applications of paint, which is a time-consuming operation, methods of obtaining the thickest possible coat in one application are being studied. The possibility of using self-healing paints, *i.e.*, based on refractories that partially melt at molten-steel temperatures, has received some attention. Some selected combinations of SiO_2 and Al_2O_3, and SiO_2 and MgO have shown promise, but difficulties are foreseen in applying such paints in practice. Further work on inflammable type paints has resulted in the formulation of suitable paint compositions that are being used successfully in member foundries.

Metal Penetration.—The pressure-casting technique, developed for simulating high ferrostatic pressures, has been employed for determining the resistance to metal penetration offered by various types of sand mixes and to study the mechanism of penetration. Among the factors studied has been the effect on metal penetration of ramming density, the grain size of the sand, the results of adding various proportions of fine fillers, and the use of zircon sand. A most important conclusion reached so far is that complete resistance to high ferrostatic pressures is obtained only from sand mixes of silica or zircon, having a grading approaching the fineness of the refractory base used in paints. The problem now is to decide which is the more practicable and economical procedure, *viz.*, the application of a thick coating of paint on to a normal silica sand or the use of these very fine sand mixes, some of which, especially the siliceous ones, may have poor thermal stability and be more liable to expansion defects. By a thermal analysis of the sand during and in the absence of metal penetration, some indication has been gained of the speed of metal penetration and how metal penetration affects the thermal conditions in the sand.

Factors Affecting the Erosion of Moulds by Molten Steel.—A casting technique has been developed by which the amount of sand erosion taking place during the passage of molten steel can be measured quantitatively. Using this technique, the effect of changes in bulk density of the sand, the type of bonding agent, and sand grain-size have been investigated, and also the effect of varying the amount of metal poured. It has been found, contrary to published opinion, that erosion increases progressively with the amount of metal poured.

The amount of erosion is related to the density of the sand compact and to the grain size of the sand employed. Erosion is minimized by harder ramming and by the use of a finer sand, but in both cases there is an increased tendency towards

expansion scabbing defects. Varying the type of bonding agent does not appear to affect the amount of erosion, but does affect the density at which expansion defects begin to occur. By increasing the resistance of the sand to expansion scabbing, cereal additions allow harder ramming and thus minimize erosion.

Thermally-stable sands, *e.g.*, zircon of very fine grain-size, greatly reduce the amount of erosion without producing expansion defects, but equally thermally-stable sands, *e.g.*, molochite and olivine in coarser gradings erode similar to silica sands. This suggests that erosion is not a function of thermal instability, but is due to the ability of the metal to penetrate the surface of the sand and force out the sand grains.

Friability of Greensand Moulding Mixes on Air-drying.—A correlation has been found between the friability of greensand compacts on air drying and the dry compression-strength of the sands. The correlation is not affected by the variation in sand grain-size or by the type of bonding agent, the only exceptions being sand containing additions, such as dextrin, that harden the surface on air drying. The addition of wetting agents and moisture-retaining materials to the sand have little effect on friability and the greatest benefits are obtained by the use of hardening sprays. So far, little correlation has been found between friability of the sand and its resistance to erosion by molten metal. The prevention of friability seems to be more advantageous, therefore, in lessening the chance of loose particles of sand falling into the mould during movement and handling.

CO_2/Sodium-silicate Process

A simple test casting and testing procedure has been developed for determining the knockout properties of CO_2 process coresand mixes. Several types of sodium silicate and a wide range of organic and inorganic additives have been investigated. Several organic materials, in additions of 1.5 per cent. by weight, have been shown to be fairly effective in assisting core removal after casting without seriously impairing core-strength properties. Among the more beneficial additives tested were pelleted pitch, dextrin and coal-dust, and certain proprietary organic additives.

Certain inorganic materials were also effective, but higher additions were required than in the case of the organic materials. Refractory clays such as ball clay or china clay, were the most promising of this group of materials. Calcium carbonate, either pure or in the form of ground chalk, was found to be moderately effective, whereas sulphate materials, having different decomposition temperatures, were less beneficial. Ammonium chloride in the form of pellets gave fairly good results without lowering core quality, but rough castings resulted if the pellets were present at the metal/core interface. In granulated form, this breakdown agent gave very good results with less pronounced surface roughness. Some improvement in core collapsibility was obtained by using silicates of higher silica:soda ratio, but very high ratios (3:1) gave poor quality cores. The importance of keeping the silicate addition as low as possible has also been demonstrated.

Moulding Sand Compaction

Work at Sheffield University.—This work is now complete and has been concerned primarily with the flow properties of bonding clays in relation to their effect on the flowability of moulding sand mixtures. Three methods have been used to study the flow properties of clays in the range of clay/

Examination of a gearwheel made of cast steel by ultrasonic methods; a probe is moved over the ground surface and any defects present are indicated on the ultrasonoscope.

Group of visitors in the centre is studying display panels illustrating the activities of the BSCRA Steelmaking Section. The display relating to the testing of shotblast abrasives is on the extreme right.

water ratios found in moulding sands, *viz.*, a capillary flow viscometer, a shear-plate viscometer at constant stress, and a parallel-plate viscometer at constant straining rate. As the conditions of flow in the capillary viscometer differed from those to which the clay films are subjected during the compaction of moulding sands, the method was discarded. Stress/strain curves at constant stress and at constant strain rates have been determined for a number of clays and the effect of film thickness and the clay/water ratio studied. The results are being analysed in relation to their practical significance in terms of the compaction characteristics of moulding sands.

Work at BSCRA Laboratories.—The study of the effects of grain size and grain-size distribution on the packing density of the sand has been extended to include moist bentonite-bonded mixtures. Compared with the dry, unbonded mixes, these additions caused a marked reduction in density, although showing the same trends as regards bulk density. There was no correlation between bulk density and permeability and thus, when the degree of compaction is increased in this way, casting defects, such as metal penetration, are not necessarily reduced.

Mould and Core Bonding Agents

Apparatus has been constructed for determining the amount of sagging of organically-bonded sands during baking, and the resistance to sagging of several air-setting binders has been measured. The effects of the amount of binder, clay additives and air-set strength have also been investigated. The possibility of hastening the setting of air-hardening binders by "gassing" with air or oxygen is under investigation and a series of special binders (styrenated alkyds) that harden by evaporation of a solvent are being tested. The properties of cereal binders are being evaluated and the aspects covered include the effects of cereal additions on the strength properties of both clay- and oil-bonded sand mixtures, the bonding properties of the cereals alone, and the effect on mould properties as indicated by wet-tensile, thermal shock, friability and erosion tests.

Data Sheets on Moulding Sands

Work is continuing on the determination of the properties of further sands for inclusion in a revised edition of the special publication "Data Sheets on Moulding Sands." A simple apparatus for measuring the specific surface of sands has been constructed and standardized for use as a routine test.

Exogenous Inclusions in Steel Castings

Instead of activating silica-sand grains coated with ceria, it has now been found possible to activate the ceria alone and then use it to coat and label silica sand grains, this being much more economical and just as effective as the earlier procedure. Tests have shown that the activated coating is firmly affixed to the sand grains, even after being in contact with molten steel for some time. Activated-sand compacts have been placed in the runner system and in the mould cavity and loose grains of sand have been placed on the bottom of the mould. Only when activated sand was used in the runner system were active sand grains removed to another part of the casting. These inclusions always took the form of large agglomerates of sand grains in a slaggy matrix and were situated at or just below the surface of the casting. Even when the activated sand was added to the metal stream during pouring, the sand grains still coalesced to form larger inclusions at the surface of the casting. Chemical analyses of the inclusions showed them to be mainly of SiO_2, but containing a high percentage (10 per cent.) of MnO.

Factors Affecting the Soundness of Steel Castings

A critical review has been made of the available literature relating to the soundness of steel castings and a bibliography of over 300 references has been prepared. Work has commenced in investigating the foundry variables that affect feeding, and work so far has indicated that the degree of mould compaction and pouring temperature within practical limits have little effect on soundness. A detailed study of the literature on the liquid and liquid to solid contraction of steels has disclosed very little information relating to alloy steels. Methods are, therefore, being developed for determining the shrinkage and feeding characteristics of such steels.

Metallurgy

Microporosity in Steel Castings

In a preliminary series of experiments, it was

shown that microporosity varied with the width of freezing range, as controlled by the carbon content. A further series of steels was, therefore, made within closer compositional limits and covering a wider range of carbon content. For each carbon content, a series of pouring temperatures was used representing differing degrees of superheat above the liquidus temperature. The castings were assessed for microporosity content by the point counting of semi-microradiographs. The results indicated that the degree of superheat had no significant effect on the incidence of microporosity. Furthermore, steels with carbon content up to 0.45 per cent. contained no more microporosity than 0.10 per cent. C steels. In steels containing 0.45 to 0.85 per cent. C, microporosity appeared to increase with increasing carbon content. It was, therefore, concluded that in the commonly-used steels with carbon content lower than 0.45 per cent., superheat and freezing range do not, to any practical extent, influence microporosity.

Heat-treatment of Steel Castings

Laboratory work on the effect of heat-treatment on mechanical properties of cast steels has continued. It has been shown that, in a 1¼ per cent. Cr-Mo steel, an anneal prior to hardening and tempering is not particularly beneficial to mechanical properties. Work is continuing on the effect of hardening times for this class of steel.

Intergranular Fracture in Steel Castings

This investigation, which is now nearing completion, is being conducted in the metallurgy department of Sheffield University under the direction of Professor A. G. Quarrell. It has been shown that steel castings containing precipitates of aluminium nitride at the prior austenitic grain boundaries will fracture in an intergranular manner. Variations in the carbon and sulphur contents of the steel have an important effect on the incidence of this intergranular fracture. The current opinion following this work is that for a given amount of aluminium nitride at the grain boundaries, the factor that determines whether an intergranular or a ductile fracture will occur is the relative weakening powers of the nitrides at the grain boundaries and of the sulphur particles and other inclusions within the grains. If the grains themselves are strengthened, as by the addition of carbon or other alloying elements, then an intergranular fracture will occur more readily. Work is continuing to test this hypothesis in all its aspects.

Microsegregation in Cast Steels

Pure iron binary and ternary alloys have been used for *ab initio* work on microsegregation. Several methods have been applied in an attempt to obtain quantitative measurement of microsegregation. All of these, including the scanning electron probe microanalyser, have so far proved unsuccessful on the special alloys made, and also on conventional and special cast steels. Work under this heading is also being done under contract from the War Office on the development of high-tensile cast steels. The results obtained so far have not been very encouraging, as the composition on which most of the work has been done appears to be difficult to cast completely sound, and at the 100 tons per sq. in. tensile level the ductility is lower than is desirable. The work is continuing with an investigation of the effect of solidification rate on the mechanical properties obtained at high tensile levels.

Factors Affecting the Properties of Cast 13-per-cent. Cr Steels

Initially, the effect of steelmaking variables, including deoxidation practice, are being investigated. Deoxidizing additions have included aluminium, selenium, titanium and zirconium, and heats have been made using 100 and 50 per cent. of 13-per-cent. Cr process scrap, and none at all in the furnace charge. Mechanical testing and micro-examination of these steels is in progress. Mass, in so far as it affects solidification and cooling rates, will later be studied. Also, the vacuum induction melting furnace will be used to investigate the effect of gas content and residual elements.

Deoxidation of Cast Steel

The recent installation of the 56-lb. vacuum induction melting furnace will make possible a fundamental approach to the problem of deoxidation, its effect on non-metallic inclusions and properties of cast steels. Initially, the separate and combined effects of aluminium, oxygen and sulphur on the type of inclusions in iron/carbon alloys will be determined. This will then be followed by a study of the effect of other deoxidizers and desulphurizers, with and without aluminium (*e.g.*, Si, Mn, Ca, Ti, Zr, Ce).

Work carried out on the vacuum furnace so far has been concerned with finding suitable materials for containing the melt and suitable charge materials, determining the losses and control of composition during melting, and developing an operating technique of the plant as a whole.

Plant Engineering

Sand Reclamation

Work has continued in several fields of investigation, including methods of sand scrubbing, the treatment of effluent water and the estimation of the total clay content. Two pilot-units have been designed and consructed in the Association's workshop for reclamation of moulding sand by an intensive dry-scrubbing action. One unit is a dry pneumatic scrubber. Up to the present, it has not been possible to reduce the clay content below 2.8 per cent. with this apparatus. The second unit is essentially a wire helix rotating in a column of sand to produce an effect similar to that of an Archimedean screw. Preliminary tests on this type of apparatus are promising and have verified the theoretical deduction that a cleaner sand may be produced than by other dry reclamation units.

Work on the wet system has been mainly confined to the treatment of effluent water. Trials at the Association have shown that, by the addition of chemical reagents to create flocculation and permit fast settling rates, 90 per cent. of the effluent water may be recirculated quickly and

BSCRA Annual Report

economically. A summary is being made of the technical and economic aspects of wet reclamation methods.

Work has continued on the assessment of cleaned sands. The amount of live clay in a sand mix can be accurately estimated by making careful use of the nickel/ion adsorption technique. Also, the normal AFS clay-test produces more accurate and reliable results with a sand containing live and dead clay, if it is previously milled, preferably in water to prevent the loss of fines. Work is in hand in attempting to relate the clay and corresponding alumina contents in a sand mix.

Efficiency of Shotblasting

Testing has continued on steel shot and on cut wire, using the modified method of test, in which additions are made to the charge at regular intervals to maintain it at its original level. A study of the effect of air resistance on abrasive velocity has been made and tests carried out at various projection speeds have revealed large variations in abrasive breakdown rates. It is hoped that this work will eventually lead to the determination of critical abrasive-impact velocities.

The effect of sand contamination of abrasives on the wear of impeller blades has been carefully studied. It was found that the presence of 2 per cent. sand by weight increased blade-wear by up to five times, and 5 per cent. sand increased blade-wear by as much as 15 times. These figures illustrate the need for efficient operation of abrasive separators in commercial shotblasting plant. The testing of a number of cut-wire samples of particle sizes ranging from 0.032 to 0.080 in. have shown that, under testing machine conditions, cleaning efficiency is highest when using particles between 0.050 an 0.060 in. dia. This finding should also apply in full size blast-cleaning equipment.

Work is continuing on wire abrasives to determine the effect of the various physical and metallurgical properties and manufacturing processes on their blast-cleaning efficiencies. For this work, a series of wires 0.060-in. dia. is being obtained direct from the wire manufacturers.

Atmospheric Pollution from Steelmaking Processes

Data to assist an assessment of the contribution to atmospheric pollution by the foundry steelmaking processes, *viz.*, electric-arc furnaces and Tropenas converters, have been obtained by the Association and previously reported. This information has been very useful in discussing the subject with the Alkali Inspectorate and the staff of member companies.

Recently, tests have been made on Tropenas converters fitted with a wet collector for cleaning fume. As expected, the emission from the collector retains the characteristic brown colour, although the Association's tests have confirmed that approximately 75 per cent. of the total weight of dust and fume generated by the converters was retained by the collector. Comparison of the results from sampling fumes emitted from a 4-ton electric-arc furnace, using ore boil and oxygen injection, respectively, has shown that the peak emission of fume when ore boiling is much less than when oxygen boiling, but the total weight of fumes per ton of steel melted emitted during the whole melt using ore boil is definitely not less than when using oxygen injection and may be more.

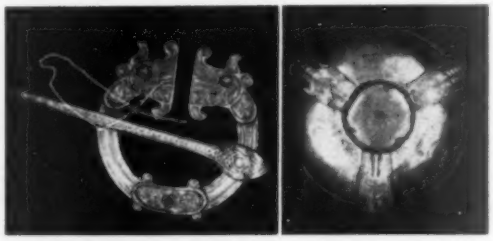
Sampling has been made also in a member foundry on an experimental installation, in which fumes have been extracted from a 2¾-ton electric-arc furnace through an opening in the side wall of the furnace. This experiment has confirmed that fumes can be controlled using a much lower exhaust-rate than with a hood extraction.

(To be continued)

St. Ninian's Isle Hoard*

Recent excavations directed by Professor A. C. O'Dell of the University of Aberdeen on the uninhabited Isle of St. Ninian, in the Shetlands, led to the greatest single find of native Celtic art ever to be found in Scotland. Included in this hoard of eighth-/ninth-century art treasures were 12 cast brooches, all penannular in shape and made in gilt with the exception of one made in silver. The illustration shows two of them, the left-hand of which shows the terminals to take the form of heads of large animals appearing to glare at one another, with jaws closed, but teeth bared. A beard and forelock and curling nose-tip and ear contrive to give them a rather rakish look.

All the brooches bear relief decoration on the upper surface, largely of linear interlace designs. They were found complete with their pins and



were undamaged (unless for the loss of some of the coloured glass insets). The hoard was in the nature of a "cache" and everything points to it having remained untouched since it had been hidden for safety on the approach of the pagan Norse just over 11 centuries ago. Nothing was found to shed any light on how the brooches were cast. (The find nearly doubles the number of eighth/ninth-century brooches already known from Scotland.)

* Abstracted from *Antiquity*, Vol. 33, No. 132, December, 1959.

Bulgarian Technology

The June issue of *Maschinostroene*, the Bulgarian journal, contains two articles of particular interest to foundrymen, as follow: "Complexometric Method of Determining Zn in Brass containing Zn, Cu, Sn, Pb, Sb, Ni, Fe and Al." by Y. Gabrovska and H. Erinin, and "New Method of Determining the Strength of Sodium-silicate-bonded Foundry Sands," by Al. Bradvarov.

Vienna Congress Papers, I

Synopses, Abstracts from and Comments on the Technical Papers presented at the 1961 Meetings held under the Auspices of the International Committee of Foundry Technical Associations.

The technical sessions of the International Foundry Congress in Vienna took place on the Monday (when six papers were presented), over the whole of Tuesday (18 papers), and on the Wednesday morning (eight papers). Although simultaneous sessions were held, the timing was such that only a quite limited period was available for presentation and discussion of each paper. The contributions themselves were generally of high quality and many of them will repay extended study at leisure.

Many foundrymen may have thought the nine months which had elapsed since the previous Congress was held in Zürich was insufficient a period of gestation for a new crop of technological contributions to be available in time for the Vienna proceedings. However, events proved the contrary, and most of the contributions were of high standard and represented both new thought and further significant developments in the foundry world. That the time was indeed too short for producing printed copies of the papers in advance of the meeting was shown by the fact that the volume of preprints* was not handed to delegates until they arrived in Vienna. Unfortunately, this left them with scant time before the sessions themselves in which to read the contributions which interested them or to prepare their own comment for putting forward at discussion time. Added to this, of course, the papers could be and were printed in any one of the three official Congress languages—English, French or German—and although brief synopses were included in all three languages, these proved inadequate for detailed appraisal of the "meat" contained within the pages.

It followed from the foregoing remarks that the authors' own presentations and summaries of the papers in the various sessions was even a more-important feature than usual, particularly as simultaneous translation through earphones was available in all three languages—a much appreciated feature of the Congress organization. In some of the sessions, lecturers took almost all of the time allocated to them to present their papers and discussion time was curtailed. In others, even though there was time, comments were scanty and not always adequately replied to because of possible misunderstandings in translation. However, it is presumed that persons who wish to discuss individual papers with the respective authors are still free to do so by correspondence, either through the Congress secretary at the address* referred to or direct with authors.

What follow are synopses and abstracts from the various papers together with a few comments on the material presented or on discussion contributions.

*Copies of the complete volume of preprints of papers presented at the Congress (a 365-page publication) may be obtained from the Congress secretary, Dr. F. Sigut, *Verein Osterreichischer Giessereifachleute, Persetelgasse* 1, Vienna, 9, at a cost of 250 Austrian sch. (about £3 12s.) plus postage. Individual papers are also available at 12 Austrian sch. each (about 3s. 6d.), again plus postage.

Study of Melting and Crystallization Processes by the Microscope

(Austrian Paper)

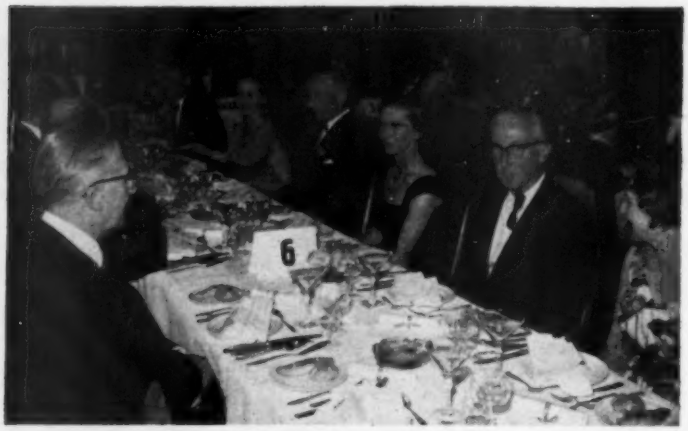
By Prof. R. Mitsche, Prof. F. Gabler, Dr. W. Wurz and Prof. M. Brandstatter-Kuhnert

(in German)

As direct observation of the microstructure of metals and their alloys had become more and more important, these Austrian authors had directed their efforts to permit also observation of melting processes under the microscope, and in their paper they described the apparatus designed for such observations. This consisted of a metallurgical microscope of the inverted type fitted with a micro-furnace. In the latter, the specimen could be heated to temperatures of 1,800 deg. C., either in high vacuum or in a gaseous atmosphere. A series of pictures of s.-g. cast iron were taken as an example of the application. After heating, melting of the iron could be seen easily, as also could the dissolution of the graphite spheres and, on cooling slowly, the reappearance of graphite and its growth. As a further illustration (though not applied to metallurgy) the authors had taken Tammann's method, starting from the transformations occurring in transparent organic compounds, had made analogical conclusions and a short film of such transformations was also shown at the Congress.

Comment

About 80 to 90 delegates were present when the above paper was delivered in the *neuer saal* at the first technical session of the Congress. Then to supplement his remarks, Prof. Mitsche presented the two short films, the result being that time allocated was exceeded. However, so great was the interest that a second showing of the



Part of the assembly of official delegates of the 22 countries represented at the Vienna Congress during the dinner given in their honour on the Wednesday of congress week.

films was arranged for a supplementary audience at the end of the session.

As far as the writer is aware, this was the first occasion on which a record of high-temperature microscopy had been placed before a foundry audience and the showings were most impressive. It is quite one thing to read about phase changes and quite another—and much more enlightening—to see them actually occurring in metal while it is being heated under the microscope. It is hoped that the techniques will be further developed so that this new "tool" can be more widely used. As an example of co-operation between an equipment manufacturer (Reichert Optical Works) and leaders in research, the report was truly outstanding.

Melting of Blackheart and Whiteheart Malleable Cast Iron in a Guillamon Furnace

(Austrian Paper)

By J. Guillamon and F. Lutz

(in German)

The type of melting furnace described in this paper it was stated could be used especially for the melting of both blackheart and whiteheart malleable cast iron, and also for grey iron. A number of difficulties were pointed out which rendered the traditional design of a cupola furnace unsuitable for the production of blackheart, due to requirements of chemical composition, mechanical properties, and iron temperature. The authors then described a cupola furnace with a superheated bottom section, of Guillamon design by means of which, in addition to an adjustable and precise control of the composition of the metal, a high iron temperature could be obtained from purely synthetic charges. It was stated that the furnace is equipped with reciprocally-operated jet tuyeres, and its forehearth is connected to the furnace shaft by means of a flat channel hermetically-sealed against the open air. Iron can be tapped at any time in varying quantities through a taphole provided with a special locking mechanism, slag being removed over a water vessel and granulated. The volume of combustion air could be automatically regulated and combustion proceeded upwards to the furnace top and partly to the bottom. An automatically-controlled percentage of the combustion gases can be tapped off through the forehearth and this resulted in the superheating of iron on the furnace bed in the connecting channel and in the forehearth.

Furthermore, the authors explained that the carbon and silicon contents of metal from the new furnace could be regulated within certain limits by control of the amount of wind and of the gas drawn off. In conclusion, the authors claimed that the installation described in the paper was economical in initial cost, since only the control unit for wind and gas had to be added to what was essentially a cupola furnace with a forehearth. Operating costs also were at a minimum it was said, because it was a synthetic-iron producing process which employed only reject castings and steel scrap.

Comment

About 40 delegates were present for this first paper presented in the *rittersaal* of the Hofburg. Unfortunately for the writer, the proceedings were in German and the English-translation radio was not switched on so that the translator's comments in that language were lost. By the time it was realized that the technical hitch lay in the translator's booth and was not a defect in the headphones, the authors' summary of the paper was concluded; there being no immediate discussion, the chairman thanked the speakers for their contribution and moved on to the next paper.

Phenomena of Running and Gating for Iron Castings in Relation to Uniform Mould Filling

(Hungarian Paper)

By Dipl. Ing. A. Kalman

(in German)

In his opening remarks, Mr. Kalman said that in the production of castings—especially in the case of heavy castings— some characteristic faults might be observed if running was effected through ingates of equal diameter placed on a common runner. These faults, he continued, might for the most part

be traced back to non-uniform filling of the mould. Practical experience and mathematical analysis both showed that ingates of equal diameter placed on a common runner did not let through equal amounts of liquid metal. Inequality of mould-filling rate might be determined on the basis of hydrodynamics by determining the pressure acting along the runner. Theoretical investigations—which were elaborated upon in detail in the paper—had proved the fact that at the opposite end from the sprue, the pressure was highest in the case of runners of uniform diameter and lowest in the case of those of uniformly decreasing diameter. According to experiments carried out the calculated values applied in the case of ten ingates and five different diameter ratios respectively. The degree of inequality of filling was smaller, the greater the diameter ratio and the back-pressure of the liquid metal and the gases in the mould.

Elastic and Mechanical Properties of Piston Rings

(Swedish Paper)

By Prof. C. Englisch

(in German)

Prof. Englisch said that no matter how they were cast and machined, piston rings and the materials used for their manufacture, were of interest generally to ironfoundry metallurgists, even outside the narrow circle of specialists. The reasons were that (*a*) nowadays, piston rings were based on all types of cast iron and (*b*) that apart from the demands for operational wear-resistance and permanence of strength properties, they had to meet certain requirements in regard to elasticity and mechanical strength in their role as comparatively high-duty resilient constructional units.

When discussing materials for piston rings, importance should be attached not only to composition and shape of all members of the unit (be it in the as-cast state or subsequent to possible heat-treatment), but also to stress/strain behaviours. Futhermore, consideration should be given to the complex operational strain imposed on the rings of piston-type engines and to their fracture-resistance properties under statical and dynamical bending strains. The author reported his investigations to elucidate such problems and concentrated upon the elasticity and mechanical properties of the material used for present-day piston rings. The test specimens were classified according to casting method, type of cast iron used, and type of treatment. Following a description of the procedure used for examination, the author then presented the results of his tests, and the paper concluded with a summary of the elasticity and structural-stability values obtained for the various types of material available for to-day's engines.

Comment

The 50 attending to hear this paper were quickly impressed by the way the author presented it as a compilation of data collected in the foundry. Although it dealt with a specialized subject—and then mainly tensile and elastic properties—he was able to relate his findings to general practices so that even the non-specialized in his audience could follow the developments reported.

Scene in one of the main assembly halls of the Hofburg during the Congress banquet on the Friday evening, attended by well over 1,000 delegates and ladies.

Reference was made earlier in the Vienna Diary to a novelty "ladles" introduced during the banquet. In this illustration, Mr. D. A. Richards (president of the IBF) is admiring one of these ladles carried on a three-wheeled bogie and containing bottles of wine. Surmounting the assembly is an arrangement of giant sparklers which added to the "foundry" atmosphere, and on the top is a firework which, on being ignited, provided a finale to the display. The waiters serving this wine were attired in suitable protective foundry garb and appeared with blackened faces.

Asked at discussion time what he meant by the degree of completeness of the information derived from the stress/strain diagram, the author explained that the diagram, in fact, formed a rough triangle from the loading point to the breaking point and down to the base line. This picture did indeed give a fairly complete assessment of ring behaviour. The greater the triangle's area, the better the material for its purpose, other factors being equal. As to the effect of hardness, the author was of the opinion that good piston-ring material should have quite a low hardness for a given composition so that it was easily machineable initially.

The present writer entered this discussion to mention surprise at finding that some of the author's stress/strain diagrams of ring tests on which a plot was made of the gradual release of load from a value below the breaking point showed reversion exactly to the starting point, whereas in his experience, there was always a degree of permanent set or deformation. He also mentioned the use which could be made of a calculated figure for the area under the load-extension graph in a ring test as an assessment of the quality of the material and here reference was made to the contributions of Mr. G. W. Williams to the proceedings of the (British) Institution of Mechanical Engineers on this subject in the late 'thirties. The author confirmed his knowledge of this earlier work and the fact that his new findings fully supported it.

Study of Nuclei by the Granule Method: Applied to Aluminium

(French Paper)

By C. Mascré, A. Touguet and M. Brouzy

(in French)

Thermal analysis of measured granules had enabled the nuclei present in an alloy to be studied independently of the rate of growth of crystals, and this separation of the two factors of grain size helped the authors to assess clearly the part played by solidification nuclei, which they reported on. Subject to certain precautions being taken, the authors stated that the method described was suitable for all pure metals and elements.

For aluminium, thermal analysis of the granules showed that (*a*) in pure aluminium (99.95 per cent. and over), for granules about 1-mm. in size, the most important nuclei were those distributed over the surface at a density of 0.1 of a nucleus per sq. mm. for 9 deg. C. under-cooling and 10 nuclei per sq. mm. for 45 deg. C. under-cooling; (*b*) the nuclei were unaffected by the addition of copper, zinc, iron or silicon; (*c*) the addition of even 0.005 per cent. titanium produced numerous nuclei which were active at about 1 deg. C. under-cooling; (*d*) when the titanium content was low (0.015 per cent. for instance), the nuclei could easily be "sterilized" by great heat (subject to certain conditions of time and temperature), and after such heating, always reappeared and regenerated on solidification; (*e*) in the eutectic of aluminium and silicon, phosphorus produced nuclei which behaved in the same way as those due to the presence of titanium in pure aluminium (as regards sterilization and regeneration.)

This had led to an attempt by the authors to define the limits of the action of the nuclei and it was found that (*a*) nuclei tended to promote the grain-fineness of alloys rich in solid solution, but provided no stimulus and might even be harmful in eutectic alloys; (*b*) that the average thickness of of dendritic branches of solidifying metal was not affected by the presence or absence of nuclei, though it responded to changes in the cooling rate and the content of alloying elements, and (*c*) that a liquid alloy must be treated according to a fixed time/temperature schedule in order to obtain the most favourable state of "seeding" or "sterilization." Finally, the authors stressed the importance

of the influence of the original raw materials on the nuclei present in alloys.

Effect of Slag on the Properties of Cast Iron

(Hungarian Paper)

By Dipl. Ing. F. Varga

(in German)

Considered apart from the raw materials charged, chemical composition of a cast iron was determined by the metallurgical conditions of the melting equipment, *i.e.* by the composition of slag formed during the process. According to results of earlier investigations, the author said it was frequently assumed that it was the slag itself which exerted an influence on the rupture strength of cast iron. Laboratory experiments had shown that a change in slag composition first caused a direct change in the composition of liquid iron, *viz.* a decrease of the slag basicity could decrease carbon-saturation value and, in consequence, it might be that it was the main factor responsible for the improvement of mechanical properties of the iron. This change could also be observed on the size and number of graphite lamellae. When the slag volume increased the carbon saturation value increased and with this, a worsening of mechanical properties occurred. A protraction of the superheating period had a similar effect.

Balance of Materials and Calorific Balance of the Cold-blast Cupola

(German Paper)

By Prof. W. Patterson, Dr. Ing. H. Siepmann and Dipl. Ing. H. Pacyna

(in German)

In order to determine effects of the influence of coke ratio and blast volume on the balance of materials and the calorific balance of the cold-blast cupola, 17 melting experiments and a large number of measurements were carried out on an industrial acid-lined cupola of 30-in. i.d., tapped periodically. During these experiments, the coke ratio and blast volume were graduated from experiment to experiment, all other factors remaining constant. By establishing equilibrium for each hour of operation, it was possible to follow up simultaneously the dynamics of the furnace run. The balance of materials showed that when great precision is required, even flue dust could not be neglected.

It was also necessary to take into account increase of blast temperature in the blower as well as the volume of air required for melting loss and the combustion of hydrogen in the coke. If the balance of materials was established exactly, a comparison between the measured and the calculated blast-volume would reveal to what extent

After the Congress closing ceremony, some of the principal officials are shown on the steps leading down from the "festsaal" of the Vienna Hofburg, accompanied by delegates and their ladies. On the extreme left is Mr. R. Ziegler (director of the Austrian Foundry Research Institute); third from the left (front row) is Dr. Sigut (secretary of the Austrian Foundrymen's Technical Association, and of the Congress); on the left-hand side is Professor Sans Darnis (president of the Congress). Also in the front row, second from the right, is Mr. R. Doat (International Committee vice-president) with Mrs. Doat next to him. Behind Mr. Doat is Mr. M. Vuilleumier (Committee past-president and treasurer) and behind Prof. Darnis is Dr. Lo Pinto (bow tie) from Italy.

Vienna Congress Papers, I

blast losses depended on blast pressure. Results of experiments carried out by the authors demonstrated that during the first hour, the coke bed burned down considerably to compensate for heat expended, but, as a general rule, filled up again during the second hour as a result of the arrival of regular charges of coke.

As to the calorific balance, radiation and storage losses of the cold-blast cupola were also determined empirically by measuring the temperatures of the shell and the lining, and by comprehensive calculations. These losses amounted to about 6.5 per cent. of the total heat and were, in the first hour, about three times greater than in the fifth. Other data of the heat-balance were equally subjected to characteristic changes with increasing times of operation. When all possible factors affecting the balance of materials were taken into the authors' calculations, the differences between heat supplied and heat expended were found to range within the limits of ± 1 per cent., both in the hourly average and in individual experiments. The results obtained thus appeared to be quite reliable.

In order to determine the dependence of the temperature of the iron on the coke ratio and blast volume, the principal data of the heat-balance were presented graphically in the paper. The maximum iron temperature resulting from the optimum blast-volume, *i.e.* maximum of heat utilization, was found to be consistent with a minimum of other heat expenditure. Causes of this minimum were put forward, first, as the decreasing radiation and storage losses of the furnace, when the blast volume increased, and, second, the increasing amount of sensible heat in the flue gases. From the results of the experiments, it was estimated to what extent the optimum melting performance of a cupola depended on furnace design and composition of the bed and burden. From the point of view of operating practice, it was important, in addition to the correct adjustment of the coke ratio and blast volume, to make sure that increased coke requirements during the initial period of melting were compensated for by an appropriate height of bed coke or by charging supplementary coke at the right time. In conclusion, the authors stressed that constant operating conditions, a sufficiently long duration of experiments and a considerable number of measurements were most essential requirements for carrying out and evaluating cupola behaviour.

(To be continued)

Manufacturing Activity in Australia*

Two surveys of manufacturing activity in Australia have been produced by the Commonwealth of Australia, Department of Trade, Canberra, and are available free of charge from the Office of the High Commissioner for Australia, Trade Office, Australia House, Strand, London, W.C.2. The first survey covers basic materials and engineering industries and is divided into three sections, *viz.* (1) Building and constructional materials, (2) basic materials and processes, and (3) engineering products. Section 2 of the survey deals with every aspect of the foundry industry, including steelworks' products, metals and metal processes, ferrous castings and forgings, non-ferrous metals (smelting, refining, etc.), non-ferrous sand castings, and die-castings. In the section dealing with ferrous castings, it is stated that excluding "captive" foundries, there are nearly 350 ferrous foundries throughout Australia, employing some 7,400 persons. The value of the annual output in the industry is of the order of £20,000,000. Turning to non-ferrous foundries, the survey states that the Australian non-ferrous sand-casting industry consists of about 40 firms, has an estimated work force of about 4,000 and is located principally in New South Wales and Victoria. Few direct exports were made during the year ended March 31, 1960, but many castings are exported indirectly, as they are incorporated in products exported by foundry customers. Many non-ferrous foundries considered that there was an acute shortage of moulders and other skilled operatives, the survey states, but unskilled labour was readily available, particularly if overtime were offered. In the section covering die-castings, the survey states that Australia's die-casting industry's main products are zinc and aluminium pressure- and gravity-die castings, and brass, bronze and magnesium-alloy die-castings are also produced. The die-casting industry consists of some 150 firms employing upwards of 3,000 persons. Although many firms undertake the finishing process, such as fettling, polishing and plating, a number perfer to subcontract this work. The major part of the die-casting industry is concentrated in Victoria and New South Wales. In each of the sections, such items as production and demand, labour, materials, costs and prices and investment are covered. Section 3 of this survey deals with engineering products, and sections deal with commercial road vehicles, railway rolling stock, mechanical-handling equipment, earthmoving and excavating equipment, farm machinery, electric wires and cables, electric switchgear and motors, machine-tools, internal combustion engines and valves.

The second survey concentrates on consumer-goods industries and includes sections on domestic cooking stoves, refrigerators, washing machines and other electrical appliances, radio receivers, television receivers, passenger motor vehicles and floor coverings. The second half of the survey deals with non-durable consumer goods such as cotton woven fabrics, hosiery, wool woven fabrics, cosmetics and processed foodstuffs. In the chapter on passenger motor vehicles, it is stated that during 1959/60, about 229,000 vehicles were produced, 25 per cent. more than the previous year. The most significant factor in the development of the automobile industry in Australia has been the establishment of assembly and manufacturing plants by most of the world's major motor-vehicle manufacturing companies, and about 95 per cent. of the vehicles sold on the Australian market are either assembled or manufactured by Australian Motor Industries, Limited, British Motor Corporation (Australia), Limited, Chrysler Australia, Limited, Ford Motor Company of Australia Pty., Limited, General Motors-Holden's, Limited, Rootes (Australia), Limited, Volkswagen (Australasia), Limited, and International Harvester Company of Australia, Limited (commercial vehicles, only).

* Extracts from these surveys have already been printed in the JOURNAL, that on non-ferrous castings in the March 16, 1961, issue and on the ferrous side in that of December 29, 1960.

SECTION DEVOTED TO THE TECHNOLOGY OF PRODUCING DIMENSIONALLY-ACCURATE CASTINGS

Dynamic Accountancy*

By E. A. Ede, F.A.C.C.A., F.C.W.A.A.C.I.S.†

In the following paper the Author draws a sharp distinction between what he designates as "static" and "dynamic" accountancy. The former dealing as it does with the legal aspects of company finances, is less concerned with the functioning and growth of the firm as a productive unit than with its correct commercial behaviour. It is that lengthening arm of accountancy practice, skilfully manipulating the tools of budgetary control and work study, that offers to the foundryman the opportunity of positive control over production. From a mirror of the actual state of affairs, this branch of accounting can become in the hands of an alert management a firm guide to greater efficiency.

In his opening remarks the speaker said that it was assumed, in presenting the paper, that not more than a minority of the audience were accountants. He was used to lecturing to accountants but it was some years since he had spoken on accountancy to an audience outside the profession.

In almost all fields of human activity today, it was considered undesirable to make contact with the outside world except through the medium of a gentleman called a Public Relations Officer, whose function it was to endeavour to see that his clients' activities were presented in the most favourable light and that any unfortunate misapprehensions about them were removed. As far as the speaker was aware, the accountancy profession did not avail itself of the help offered by these specialists in public relations. Whether this was because accountants were unaware how much they and their activities were misunderstood; whether they had become fully aware of this in their days as juniors and by the time they qualified had come to accept it as a peculiar mental outlook of those outside the profession; or whether they were supremely indifferent to uninformed opinion, he would not presume to guess. However, in view of these circumstances, the speaker said that he intended to take full advantage of the occasion to tell the audience something about accountants as well as about accountancy.

Accountants' Characteristics

Firstly, in spite of certain evidence to the contrary, accountants are human. In fact, they possess, he suggested, all the human qualities common to lawyers, architects and doctors, and might even, possibly, share some of those commonly believed to be peculiar to engineers. Firstly then an accountant is a person who has spent a number of years in the study of a particular art, has satisfied examiners as to his knowledge thereof, and after providing evidence of practical experience has been admitted as a chartered or certified accountant. As such, like the members of any other profession, he was subject to strict rules of conduct and might forfeit his professional status through breach of them. He had the advantage of receiving guidance, through the recommendations of the Councils, on matters involving accounting principles. He may, in addition, have made further studies in the subjects covered by the examination syllabus of the Institute of Cost and Works Accountants and become, by examination and experience, a Member or Fellow of that body. He might either be employed in the profession or in industry. In the former case he would be concerned mainly with audits and the preparation of accounts for those concerns too small to employ a staff accountant. In this paper the speaker was considering principally the accountant employed in industry, though his remarks would, of course, apply to the work done by accountants in practice in preparing accounts for their clients.

Terminology

The speaker then joined issue with those who used new and exotic terminology in the field of work being considered. There are now management accountants, financial accountants, organizing accountants and so on, who practise management accountancy, financial accountancy, and, presumably, organizing accountancy. He could not imagine what an organizing accountant did, neither could he conceive how one could have financial accountancy without having as a corollary, non-financial accountancy. Excepted from these remarks was the term cost accountant, which was one of long standing and denoted both a member of the Institute of Cost and Works Accountants and an accountant engaged in a particular limited field of work. He suggested that accountants were accoun-

* Paper presented to the third annual Conference of the British Investment Casters' Technical Association.

† Group chief accountant and secretary, The Deritend Stamping Company, Limited, and secretary of Deritend Precision Castings, Limited, and other subsidiaries.

tants, although some individuals would, of course, have greater experience in certain spheres than others.

Similarly, accountancy was an art of which the application was sometimes directed more particularly to one specific end and at another time to a different end. The old witticism that an expert knew more and more about less and less while a business man knows less and less about more and more contained a very considerable element of truth, and he felt that specialization can easily be carried to excess.

Dual Nature of Accountancy

The paper was entitled " Dynamic Accountancy " because it was intended to make a distinction between accountancy whose end was merely to satisfy the statutory requirements of the Companies Act and which might be considered static (albeit not in a derogatory sense) and that which leads to action and which was, therefore, called dynamic. The type of accountancy practised in a particular company depends both on the accountant and on the management. If the accountant lacks the wit to see what information will be helpful to management he will be unable to present it, but if management takes no action when information is put before them calling for action an alert accountant will, ultimately, cease to trouble to produce it. There was no magic about Dynamic Accountancy. It was merely the presentation of data in the most suitable form to induce action. The means of preparation were purely incidental—whether pen and ink, a book-keeping machine, punched card equipment or a computer was used was a matter of economics. It must be admitted that the accountancy profession failed to give the lead it should have done in the use of accounts for control purposes and, because of this failure, such techniques as standard costs were evolved by engineers. Unfortunately, the extent to which the engineering industry was the parent of costing gave costing techniques a very strong engineering bias and, to this day, many systems designed for engineering businesses are misapplied to other industries, resulting in excessive detail being handled or emphasis put on cost elements not of prime importance.

Happily the accountancy profession has long since realized its responsibilities and has done a great deal in contributing to increased efficiency in business.

" Static " Accountancy

Many people would be familiar with what was once the prime function of the accountant in industry and which, for the purpose of the paper, is classified as his static work. Accounting for assets, involving the keeping of cash received and cash paid books, bought and sales ledgers, stores accounts and plant registers: the fulfilment of the requirements of the Companies Act in regard to profit-and-loss accounts and balance sheets: the preparation of standard costs, the various methods of distributing overheads: the taxation rules, are all matters which can be learned from books and many good books exist on these subjects. If, however, the accountant was only carrying out these duties it was fair to describe his work as static. He was mainly concerned with seeing that certain records were kept and that unfortunate events such as defalcations, did not take place. While failure to perform these duties satisfactorily will have an adverse effect on a business and may even lead to its ruin, positive effects such as increase in turnover and reduction in cost will not result therefrom.

Potentialities

Obviously the Accountant should not content himself with this negative state of affairs. Practically all the information necessary to make positive recommendations to top management was in his possession. From his sales ledger and invoices he had all details of turnover, from his bought ledger and suppliers invoices he had all details of purchases, from his wages data he had all information on labour turnover, wage rates and earnings, from his nominal ledger information on departmental costs and from the application of his standard costs he could obtain details of all labour and material excesses. What a wealth of material to work on! Furthermore both from his professional training and his greater familiarity with the sources of the figures and the methods of compilation and presentation, the accountant was at a great advantage in interpreting the information arising from the accountancy and statistical sides of the business.

Sales

Let us, therefore, examine these possibilities in detail: firstly, on the sales or marketing side—which travellers are doing well or badly, which customers are very satisfactory or unsatisfactory, which products are making a very large or a very small (or negative) contribution to general overheads, are any products failing to cover prime cost? All these were questions to be answered by the accountant and by the correct answers to them the prosperity of the business might be considerably affected. In the speaker's case he had presented monthly figures of sales of each product, grouped by sales areas, and in total, and reported on any abnormal trends appearing. In the past he had worked out the population of each sales area and calculated *per capita* sales. This had resulted in a re-hash of sales areas and the elimination of several areas which did not appear to justify coverage. Another point to examine was the difference between areas of sales of individual products as distinct from differences between total sales per areas. Again the make-up of areas was interesting—95 per cent. of the sales might come from a few large towns taking up perhaps only 70 per cent. of the salesman's time. Should he be stopped from covering the relatively sparsely populated part of the area and told to concentrate on the proportionately more profitable

part? Was relatively-too-much effort being devoted to low margin lines? What were warehousing costs and what was the effective utilization of one's own transport? Was the extra costs of making part shipments justifiably incurred? The accountant could make suggestions on all these matters. Much of this information was, of course, available in the form in which it was required, some might need an extra analysis and much could be obtained from periodical sample analyses.

Before leaving the sales side he said there was an aspect much nearer to the conventional idea of accounting work, which merited attention. Was selling and administrative overhead correctly apportioned between products? It was surprising how much the question of distribution costing was neglected. Yet it was an obvious duty of the accountant to get as near the truth as might be in this connection. The fact that a large part of administrative overhead must be distributed arbitrarily was no excuse for ignoring the whole question. The determination of selling and administrative overhead percentages was a job which it was probably sufficient to do only every two or three years, but it was then worth spending some time on it. Carriage could be determined with a high degree of precision; with considerably less precision, but with a considerable amount of justification, costs of selling and invoicing may be distributed on the number of orders or invoices per product and by intelligent approach on these lines a considerable part of the amorphous figure described as selling and administrative overhead might be allocated with some accuracy.

Before passing to production matters he looked briefly at purchasing. Were stock levels excessive? he asked. Would larger stocks enable purchase to be made at a price advantage more than offsetting extra storage costs? Were obsolete stocks speedily disposed of? Was the normal purchasing routine employed for small items more conveniently bought on cash purchases? Here were just a few items meriting consideration.

Production

Now as to the production side which probably offers the greatest field for constructive effort by the accountant but in which more was already being done than in the other aspects of business. Excess direct-labour costs and excess-material costs—analysis by causes was a commonplace but what about comment? Were excesses due to certain causes increasing or decreasing, what were the reasons for the improvement or worsening, did failure to earn bonus connect with high labour-turnover figures? Here were a few questions to ask and answer. A question the speaker once had to answer was, what was the financial advantage or disadvantage of continuous one-shift production of a seasonal product compared with two-shift production during the season, and his answer in favour of continuous production led to this being adopted. What were the financial considerations in connection with the replacement of machinery or the improvement of processes? Had estimates of savings put forward in support of expenditure of this nature been justified? What were the financial advantages expected from new products? Had they been realized in fact? What did one expect to gain from an incentive system? What had actually been gained? Were rectification operations financially justifiable? What was the optimum production run with regard both to selling and production requirements? All these were questions which could be answered by the accountant and answered best by him, free as he was from marketing or production bias. If the accountant's approach to these problems was objective and fairminded his advice and arbitration would be increasingly sought by his colleagues.

Office Management

Lastly, what of the office management field, in which the accountant would normally have the executive authority to take remedial action where necessary? What of the documents originated unnecessarily where an extra copy of the prime document would serve? How many works orders were produced when an extra copy of the salesman's order on a suitable form would serve? How many unnecessary journals and listings were produced? How many unnecessary covering letters dictated when forms would serve, or when covering communication was unnecessary? How many papers were filed, and refiled, which should be filed once—in the wastepaper basket! How much effort was wasted through excess noise, bad ventilation, bad lighting, bad heating? How many staff, expensively trained, were lost through lack of leadership at the top, poor supervision, or the lack of a planned salary policy?

Cost Control

Many of the matters mentioned were adequately dealt with by a periodic review, or by a special *ad hoc* enquiry, and he felt that before concluding some reference ought to be made to the more routine application of cost control.

The phrase was used to signify the control exercised as a result of the comparison of costs maintaining in two different sets of circumstances. Therefore, the point of departure was that costs involving different quantities of production, different types of labour, different manufacturing methods, different climatic factors, and so on might be compared and from the comparison, conclusions drawn which led to action. Generalizing one might say that while the scope of this technique was very wide, one did not advocate the production of a mass of figures and certainly not "desk management." Figures were a guide which told one where to look, but they were no substitute for looking. Management should verify for itself the implications of what was suggested by figures before taking action. Secondly, the justification for most statistical statements should be that they provoke action and most statements which did not lead to positive action should be discontinued. He had mentioned that the scope of cost control was very wide—

indeed it extended into all activities of the business—and one was probably wondering at just which point standard costs would be brought in. The speaker considered that there was a great deal of muddled thinking about standard costs and a good deal of misapplication of standard-cost practice. What was a standard cost? He submitted that it was purely and simply a yardstick—nothing more and nothing less. One could not measure anything without a yardstick but the exactness of the yardstick depended on what one wished to do with it. There was a difference between pacing out a piece of land to plant cabbages and measuring a window to make curtains, so a standard cost might be compiled from technical data such as operation sheets, based on time and motion study work, and specifications similarly prepared by technicians; it might be based on estimates prepared by an estimator with good technical knowledge or, at the other extreme, might be merely an assessment by a non-technical person of average intelligence of what he considered reasonable manufacturing methods and reasonable times. These were the extremes—the bias should obviously be towards the greater refinement but there was no need to go further than was necessary for the purpose in mind. In the day-to-day applications of cost control which were going to be put forward he envisaged that yardsticks or standards of varying degrees of elaborateness necessary would be used.

Propositions

The greatest use of cost control had been in control of manufacturing operations—probably not because of any greater scope for it therein, but because other applications were more difficult and because engineers were more susceptible to the technique than were sales or commercial managers. Probably most people were familiar with the application in the production field. However, he suggested that many statements were more effectively presented in units other than monetary ones—hours, tons or gallons for example.

What information might works management reasonably expect? Broadly, what level of activity they were achieving and what excess expenditure was incurred. The following statements give this adequately: (1) An analysis of excess labour costs by causes by department or shop; (2) an analysis of excess material costs by causes by department or shop. (As is probably known, it was usual to analyse excess direct labour or direct material costs by causes such as waiting materials, waiting tools, higher-labour grade used (*e.g.* man on woman's job or first-hand acting as mate), faulty tools, faulty machine, faulty material, scrap, rectification, in the one case, and excess price, excess usage, wrong size, wrong specification, in the other.) (3) A statement of Labour Efficiency showing percentage bonus earned or standard hours produced against clock hours; (4) a statement showing level of activity and actual expenditure against budgeted allowances by type of expense by department or shop; (5) a statement of stocks and of materials on order, unless this is the responsibility of the commercial side of the business; (6) a statement of expenditure against estimates on capital account; (7) a statement showing maintenance expenditure against estimates; (8) a statement of machine utilisation; and, (9) a statement of labour turnover analysed by reasons for termination. Extracts from many of these statements concerning production departments would obviously go to the chiefs of service departments for their explanation—for example, the maintenance engineer would obviously be expected to explain high waiting-time due to breakdowns and the buyer to explain high costs for non-standard material.

A further point is that the "overlapping" principle should be observed in issuing control information. By this was meant that an executive should receive the detailed figures of his immediate subordinates. For example, a works manager with a number of main manufacturing departments should receive the detailed results for each department; the department manager should receive the same information together with the detail of the various shops in his department; the shop superintendent should receive the detail figures for his shop together with the detail of the various sections which would also be given to his foremen.

Budgetary Control

It would be appropriate at this stage to refer to budgets. It was well known what was connoted by this term as used in business, but there might not be quite the same knowledge as to its compilation. It was suggested that the data used in compilation of standard costs might vary considerably and the same was true of budgets. However, the control aspect was more prominent in budgets and the need for care in compilation even greater. He felt that he might earlier have conveyed an impression that one need not be particularly careful in the compilation of standard costs. This was not his intention, which was to convey that if one had not the time-study organisation necessary to set really detailed and technically-sound standards it was still very much worthwhile to do the best one could with the facilities at one's disposal. Great care and pains were necessary in setting both standards and budgets. This was particularly so in the case of budgets because budget items usually involve larger amounts of expenditure than do individual standard-costs and were usually more disputable.

Sales Forecast

Although budgetary control was probably the rule rather than the exception nowadays, it was unfortunately true that budgets were still too-often framed on a very-broad basis. Usually the whole of the budgets started from the sales forecast or budget and this is too-often merely a global figure of anticipated sales in sterling. It might not be

possible to forecast with any reasonable accuracy, the sales of individual products, but at least, sales of product-groups in physical units should be forecast. If this were not done it was impossible to determine subsequently to what extent differences between actual and forecast sales were due to price changes, and volume changes, and to what extent differences between forecast and realized margin were due to volume, mixture and prices respectively. If a sales forecast had been prepared in sufficient detail it was a comparatively easy matter to determine the budgets for direct labour and material, by the extension of the various standard costs by the qualities forecast. What about the rest of the production budget, the overhead side? Here there was more difficulty. The first point to be appreciated was that a flexible budget was essential—a fixed budget might be of considerable use in the early stages of the introduction of a budgetary system but it was very imperfect as a control weapon. Sometimes, a budget was related to sales and termed a flexible budget. This was obviously not so, because few overhead expenses move in direct relationship to sales.

Expenses

Mr. Ede drew attention to this last point. The textbooks were prone to say that expenses might be classified as variable, semi-variable and fixed. They might be so classified but they did not behave according to the classification. It is known that, in fact, very few expense items were either completely variable or completely fixed. Probably the only completely variable item of expenditure was direct labour when paid piecework. However, some items, although not permanently fixed, might be regarded as fixed for budget purposes—such items were rents, rates, insurance and senior management salaries. Similarly, certain items might be regarded as variable—examples being shop supplies, carriage, handling, scrap. It would be seen that most expenses fall outside these two categories, and were therefore left as semi-variable. It was here that budget techniques very frequntly fell down. He took material handling as an example. Superficially it appears to be in direct relation to volume, but it was not. Two and a half men cannot be employed. It was necessary to budget indirect labour very carefully. For example, at a low level of activity one shop labourer might be allowed, but as soon as the volume increases beyond his capacity a second man was necessary. The budget then remains unchanged until the point at which a third man was necessary. If the budget allowances for this type of expense are graphed against volume, the graph will take the form of steps.

There was a further type of semi-variable expense which behaved differently. This was the type which was a mixture of fixed and variable factors—as, for example, electricity containing fixed kva charge. In this case, the cost of the variable element at different levels of production had to be determined and the fixed element added to it. The technique outlined would also apply in the construction of the marketing and administration budgets. The most essential point to observe throughout being that budgets were built up by a detailed consideration of each item of expense in each shop or department.

At this point the speaker apologized for digressing into preliminary techniques, which he thought desirable to make clear the background of the controls. In addition to the regular reports already suggested as required by works management, answers were sometimes required to such questions as those mentioned earlier.

Sales Management

The sales side of the business was then passed on to. What information did sales management require? The following categories Mr. Ede considered necessary: (1) Detail of actual sales against forecast; (2) a statement showing forecast margin and actual margin, the difference being analysed as volume variance, mixture of sales variance, and price variance; (3) a statement of actual sales expenses against budget; (4) a statement of results for individual travellers or areas, and, (5) a statement of the actual and anticipated order book position. On the commercial side the main information required was the actual costs against budget allowances. While stopping short of costing clerical work, it was obviously necessary to see accounting and other clerical costs were kept in line or below planned levels. On the office equipment side, the same techniques used to control expenditure on plant should be used.

General Management

Lastly, what was required by general management? These might be summarised as follow:—(1) The sales results; (2) the analysis, by reasons, of why actual sales have differed from forecast; (3) the budget results for the sales, production and commercial divisions; (4) actual capital expenditure compared with the capital expenditure budget; (5) the actual financial position compared with the cash budget; (6) the rate of labour turnover; (7) a statement of stocks; (8) a summary statement of labour efficiency, and (9) a statement of the actual and anticipated-order-book position.

In addition, they should have the actual results compared with anticipated of new products, new machines and new processes. Information would, from time to time, be required as to whether certain products were failing to recover out-of-pocket expenses, or whether resources employed on some marginal product could be more profitably employed.

Presentation

The speaker thought that enough had been said to illustrate the very wide scope of cost control and a word on presentation of information might be appropriate. Most of the information described would be in figures in tabular form, though it might

Dynamic Accountancy

be supplemented or even replaced by graphs on occasion. Care should be taken that only significant figures were reported. Senior executives should not be burdened with masses of detail and, in any case, it is obviously silly, for example, to report variances of £1 or £2. Expense heads which were too small monetarily to be significant should be included in a larger more comprehensive item. Most statistical statements were improved by the inclusion of a brief written report on the more salient points. Usually the person who had prepared a statistical report had the greatest knowledge of the figures and his interpretation was, therefore, well-worth knowing. If the more significant points were noted in a report, the time of the reader was saved and the more senior the executive concerned, the more important this was. Furthermore, it was usually desirable that the person making the report should draw conclusions from the figures and make positive recommendations. The reader might disagree—the conclusions might sometimes be wrong—but it was better to have a positive report which one could read quickly, possibly agree with and, if so, implement the conclusions than to have to start with the bare figures and go through the whole process of ratiocination oneself.

Conclusion

In conclusion, he submitted that: (1) The field for cost control technique extended throughout the whole of industry and commerce; (2) figures are a guide—they were no substitute for looking; (3) figures, however, did tell management where to look, and what for, and, (4) the accountant producing the information must get into a positive frame of mind about it. He must tell management what his interpretation of the figures was and suggest to them the course of action necessary. To the extent that he did this successfully, he would, himself, grow in stature and widen his business experience.

He had endeavoured, he said, in the brief paper to outline the ways in which the accounting function in a business might progress from being merely a recording function to be an interpretative function offering positive assistance to management, and, he hoped that a few of his ideas might be of use to his audience.

Outlook for British Exports

The July issue of the *LSM Export Guide* (formerly the GEC *Export Guide*) forecasts the prospects for 36 product groups of British exports to 34 countries. According to the *Guide*, the outlook for the third quarter of 1961 is "good" in 19 countries, "improving" in 3, "unchanged" in 4 (improving in 1 and deteriorating in 3), "deteriorating" in 6 and "bad" in 2. The outlook for British exports since April has improved in France and the USA, but has deteriorated in the Federation of Rhodesia and Nyasaland, New Zealand and Venezuela.

Book Reviews

Dictionnaire de Metallurgie (Encyclopaedia of Metallurgy—in French), by O. Bader and M. Théret. Published by Eyrolles, 61, Boulevard St. Germain, Paris V; price 69.65 NF post free.

This excellent book is not, as is stressed by Professor Lainé in the preface, just an ordinary dictionary, for full explanations are given of words and expressions used in metallurgy, and these are often illustrated by sketches and graphs. It will be of real use to the English-speaking public as there is a translation into English of each title—moreover there is an index of the English words appearing in the headlines. The book has a distinct foundry flavour as one of the authors, Mr. Théret, is a malleable-iron founder, and the other, Mr. Bader, is chief metallurgist to an Ardennes firm making shotblast equipment.

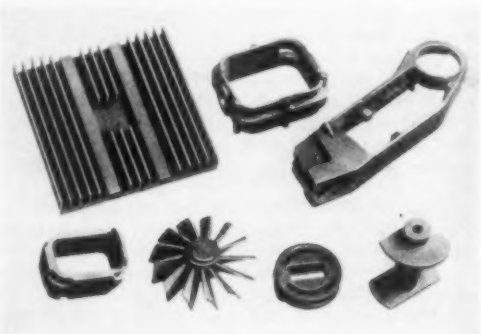
The reviewer has examined a number of the references and finds that the descriptions are clear and satisfactory, and can be consulted with confidence. Though there are more than 1,000 headings there are still some omissions, and it can be reasonably presumed that the authors would welcome suggestions for rendering future editions still more useful.

V. C. FAULKNER.

Atlas of Defects in Castings (2nd revised edition). Published by the Institute of British Foundrymen, 14, Pall Mall, London, S.W.1.

This edition makes a noteworthy advance on the earlier ones, inasmuch as a dozen pages are devoted to defects encountered in the production of precision castings made by the lost-wax type of process. Though there have been three printings, the illustrations are still quite clear. It must be remembered that this is a book compiled by foundrymen for foundrymen, for in the hands of non-technical readers, it could be as dangerous as a medical treatise studied by a layman.

Examples of items manufactured by Smiths Autop Foundry, Watford, using the investment-casting process are shown in this photograph. Easily recognized is a "heat sink," a semi-conductor heat-transfer device (top left), whilst also included are a multi-bladed impeller suitable for use in cooling applications within specialized electronic equipment and a waveguide flange. The company undertakes manufacture of many complex component parts, using aluminium alloys, brasses, aluminium-bronzes, bronze and copper materials, all of which can be produced to customers' requirements and to AID and ARB specifications.



Equipment & Supplies

Shell Coreblower

Foundry Equipment, Limited, Linslade Works, Leighton Buzzard, Beds, have introduced a medium-size, fully-automatic shell coreblower for producing medium to large shell cores at high production rates. Known as the S.C.B.20 model, the unit is the middle size of a complete new range of shell coreblowers which the company is manufacturing for the production of shell cores from very small to very large sizes. The smallest machine in the range (S.C.B.1) has a maximum corebox size of 11-in. high by 13-in. wide and 10-in. deep, and is available for hand, semi-automatic or fully-automatic operation. The largest machine (S.C.B.40), which is fully automatic, is suitable for coreboxes up to approximately 40-in. high by 40-in. wide by 18-in. deep.

The S.C.B.20 unit is fully automatic and now manufactured in England exclusively by the Leighton Buzzard firm. All movements of the machine are hydraulically controlled and there is a separate hydraulic unit with electrically-driven oil-pump and valves and a separate floor-standing electric control panel. The hydraulic unit has to be located adjacent to the machine to allow for flexible pipe communication, but the electrical panel can be located to suit conditions. One of the unique features claimed for the unit is the use of the "flip-plate" assembly which virtually hands cores to the operator at the end of the curing cycle, *i.e.*, one of the heater plates forms part of the "flip-plate" position and at the end of the curing cycle, when the corebox opens, it automatically turns through 120 deg. presenting one half of the corebox in the most convenient position for the cured shell core to be lifted out easily and quickly without danger to the operator. Thus at no time does the operator have his hands between the heater plates. It is also possible to fit stripping pins into the "flip plate" assembly. The heater plates incorporate electrical elements; it is not necessary to have heating elements embedded in the corebox. The elements are of a heavy-duty, tubular, cast-in type, fitted with thermostat control.

The S.C.B.20 machine can be provided with one or other of two standard sizes of interchangeable heater-plates, (*a*) 20 by 16 in. for coreboxes having the maximum dimensions of 17-in. high, 20-in. wide and 14-in. deep, or (*b*) 20 by 24 in. suitable for coreboxes having maximum 25-in. high, 20-in. wide and 14-in. deep. For either size of heater plate, there is a minimum gap of 4 in. between the plates, *i.e.*, the minimum depth of the corebox is 4 in. Consumptions of electric power for the two sizes of heater plates are 15 and 22.5 kw respectively, but gas heating is available if required. The machine is capable of blowing a shell core equivalent to a solid core weighing approximately 200 lb., and the maximum weight of shell core may therefore be in the region of 30 to 35 lb. Production time of course depends on the type and size of core to be produced, but the average cycle time is one minute—from pressing the start button through to removal of the core. The machine's sand box has a capacity in excess of 100 lb. Blow plates either of wood or aluminium-faced plywood can be used. The plate is easily removable for filling the reservoir with resin sand from a sack or by a flexible pipe from suitable sand hoppers with valve controls. The overall dimensions of the shell coreblower are 90¼-in. long, 52¼-in. wide and 51¼-in. high, it uses an air pressure of 80 to 100 lb. per sq. in., hydraulic oil-pressure of 800 to 1,000 lb. per sq. in. and the electric motor for the hydraulic pump is of 3 h.p. and 1,440 r.p.m.

The automatic cycle of operations of the new unit are briefly as follow: (1) Push start button, (2) "flip plate" travels through 120 deg. to vertical, (3) heater plates close, (4) dump-box raises, and (5) rolls over to blowing position, (6) blow in, (7) blow out, (8) rolls over to rocking position, (9) rock and return to vertical, (10) sand-box lowered, (11) curing time out, (12) plates out, (13) "flip plate" lowered, and (14) core removal and re-start.

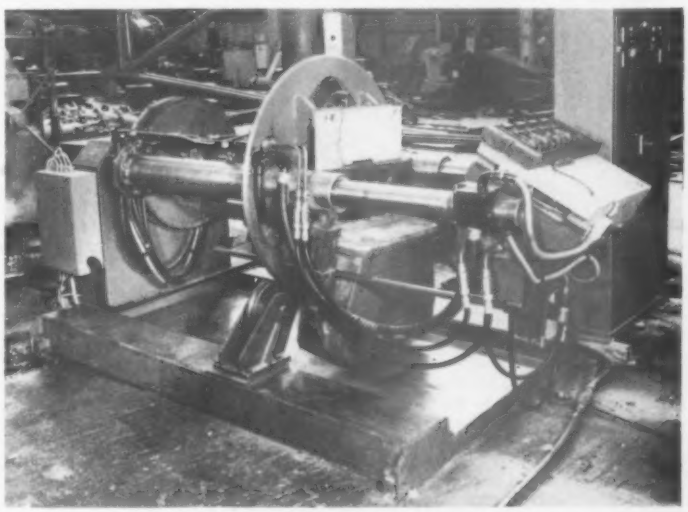


FIG. 1.—*S.C.B.20 model of shell coreblower now being produced by Foundry Equipment, Limited. It is shown in the flip-plate open position at which it presents the core to the operator at the conclusion of the cycle.*

Rack Clamp: A clamp made by Carver & Company (Engineers), Limited, Eldon Street, Walsall, Staffs, works on the simple rack adjustment principle. Amongst advantages claimed for the tool is that its short shielded screw will give a powerful grip—over 1,000 lb.—without distorting the clamp; the limited movement of the jaw pad gives secure grip on odd shapes, such as round to flat surfaces; and the clamp has no projecting screw at the top at any time. The unit, which can be operated in reverse as a jack and can also be used as a wrench, is made from heat-treated steel castings of 40-45 tons per sq. in. tensile strength. There is a choice of model T.186 with 6-in. capacity, or T.205 with 12-in. capacity; a heavy-duty model is also available.

Personal

Mr. H. C. H. MATTHEWS, B.SC., has been appointed a technical director of Pantak, Limited, of Vale Road, Windsor, Berks.

Mr. MARK PEARCE has been appointed to the board of Brymbo Steel Works, Limited, a branch of G.K.N. Steel Company, Limited.

Mr. T. P. BARLOW, works manager of the oil engine division of Rolls-Royce, Limited, has been appointed a director of the division.

Sir PETER ROBERTS, Conservative M.P. for Heeley, has resigned from the board of Staveley Industries, Limited, due to pressure of other business commitments.

For the past two years head of the research department of Mather & Platt, Limited, Manchester, Mr. THOMAS A. UTHWATT has been appointed a director of the company.

Mr. G. V. COX has been appointed general manager of sales, plastics products, of Monsanto Chemicals, Limited, and Mr. M. W. WAUGH general manager of sales, chemical products.

Mr. B. H. OLDFIELD, director and engineering manager of Laporte Chemicals, Limited, is retiring in September. He will be succeeded as engineering manager by Mr. MAURICE RUDDICK.

Mr. A. M. BAER, deputy chairman of Consolidated Zinc Corporation, has been appointed chairman in succession to the late Mr. L. B. ROBINSON. LORD BAILIEU has been appointed deputy chairman.

Lieut-Col. HAROLD RIGGALL, deputy chairman of Ruston & Hornsby, Limited, engineers, Lincoln, and chairman of the company's Australian subsidiary, has returned from a comprehensive tour of Australia.

Mr. R. H. DAVIES has been appointed deputy general manager, Liverpool domestic appliance division of the English Electric Company, Limited. He joined the company in 1956 and became chief development engineer in 1957.

Holman Bros., Limited, Camborne, Cornwall, announce that Mr. RALPH JOHNS and Mr. MALCOLM ABBOTT have been appointed assistants to Mr. J. L. RITCHIE, group sales director. Mr. J. H. HOLMAN has been appointed sales office manager.

Mr. BRIAN SHAW, technical director of Shaw Processes (India) Private, Limited, is visiting the United Kingdom, Europe and the United States of America prior to the establishment of the Shaw Process training school and pilot plant in Faridabad, New Delhi.

Mr. T. GAMMON, having reached retirement age, will retire on August 31 as deputy managing director and from the board of Vickers-Armstrongs (Aircraft), Limited, part of the British Aircraft Corporation. He will retain his seat on the board of A.B.C. Motors, Limited, a subsidiary of Vickers.

Mr. J. B. HODGSON has been appointed midland area manager, Rhodes, Brigdon & Youatt, Limited, makers of centrifugal pumps. He will be based on the company's office in Ludgate Hill, Birmingham. He has been area manager for the northern counties for three years, and was previously technical representative in London for five years.

Mr. G. H. W. CULLINAN, deputy managing director, Shell Chemical Company, Limited, relinquished his executive duties at the end of last month. However, he will remain a director and will continue to represent the company on the Council of the Association of British Chemical Manufacturers, and on various committees of the chemical industry and the Federation of British Industries. Mr. Cullinan joined Shell in 1926; in 1955 he was appointed commercial director and, later, deputy managing director.

Presentations of gold watches to mark their 25 years' service with James Neill & Company (Sheffield), Limited, have been made to Miss EDNA OXSPRING, an inspector in the hacksaw department, and to Mr. CHARLES TURNER, of the engineers' toolroom and maintenance section. These latest presentations bring the total number of watches awarded by the firm to 123. The total number of employees who have been with the firm for more than 25 years is now one in fourteen.

Mr. W. J. SULLY has been appointed technical director (Light Alloy Foundries) of Birmid Industries, Limited, and a director of the subsidiaries: Birmingham Aluminium Casting (1903), Company, Limited; Perry Barr Metal Company, Limited, and Birmidal Developments, Limited. He has relinquished his appointment as joint managing director of Sterling Metals, Limited, but remains a director. Mr. E. PLAYER, junior, a director of Sterling Metals, has been appointed general manager.

Eighty-year-old Mr. W. W. SPOONER, founder and managing director of the Spooner Dryer & Engineering Company, Limited, of Ilkley, was a proud man when he presided recently at the opening by Mr. F. J. Erroll, Minister of State at the Board of Trade, of the latest extension to his Moorland Works at Ilkley. Mr. Spooner started the company, which manufactures special drying equipment, nearly 30 years ago in premises rented for 2s. 6d. a week. The firm's products are now sold all over the world.

A cheque for £46 14s. 5d., the largest award so far given by Emco Brass Manufacturing Company, Limited, has been presented to Mr. C. CONSTABLE, who is employed in the assembly department at the company's Westwood, Thanet, factory. The award was made under a scheme introduced a year ago to encourage employees to suggest improved working methods. Mr. Constable suggested a way of increasing production during the assembly of petrol-tanker manhole covers. The presentation was made by Mr. W. F. Judd, managing director.

Vickers-Armstrongs (Shipbuilders) Limited, Barrow-in-Furness, have announced the following promotions: Mr. L. REDSHAW, a director and shipbuilding general manager, has been appointed deputy managing director of the company; Mr. R. M. NICHOLSON, shipbuilding manager, becomes a director and succeeds Mr. Redshaw as general manager at Barrow shipyards; Mr. W. PARNELL, shipyard manager at Barrow, becomes a special director and shipbuilding manager; Mr. J. L. COOPER is appointed shipyard manager, with Mr. W. RICHARDSON as deputy shipyard manager.

Mr. BERNARD OLDHAM, a 24-year-old machine-setter with Spear & Jackson, Limited, Sheffield, is the first winner of the £200 award which is to be made every two years by the Worshipful Company of Cutlers in London to a promising young man in traditional trades in the Sheffield area. The scheme was announced last January and enables winners to spend a period attending an educational establishment or training in a factory at home or abroad whose products are similar to those of his own firm. In addition to visits to firms, Mr. Oldham will spend some time with the Production Engineering Research Association at Melton Mowbray.

Research and Development at AEI-Birlec

The new research and development department of AEI-Birlec, Limited, is now housed at Wood Lane, Erdington, Birmingham, 24. It was removed there last year and is located at the side of an up-to-date apprentice school operated by the company. The laboratory (Fig. 1) is housed in a building 275-ft. long by 70-ft. wide, providing a floor area of 20,000 sq. ft. It is spanned by an overhead crane of 10-tons capacity with a 24-ft. lift. The department employs 30 people, about 50 per cent. of whom have science and engineering qualifications. The bulk of the research carried out is no longer so much directed towards fuel efficiency, as in the direction of providing optimum furnace atmospheres—a subject of ever-increasing importance in many industries. Of direct interest to the foundry industry is a pilot plant designed for the efficient removal of moisture from compressed-air lines (the company has been responsible for the installation of such a plant in the Ford foundries at Dagenham).

Excellent facilities for development work have been ensured by the availability of 750 kva of electrical power, town's gas up to 9,000 cu. ft. per hr., mains water up to 4,000 gall. per hr., recirculated cooling water up to 2,000 gall. per hr., and compressed air up to 18,000 cu. ft. per hr.

The work done originates in requests for data from the firm's own design department and users' requests for adaptations of standard plant to new industrial applications. The staff are young and keen and there is an air of urgency about the work they are undertaking. The new research department is well worth visiting by those having problems to solve in this field of engineering.

FIG. 1.—*New research and development department of AEI-Birlec, Limited. The bench work is carried out in the section of the laboratories shown on the right of the picture.*

Cobalt-Chromium Alloy for Dentistry

A new British Standard (B.S. 3366:1961) specifies basic requirements for a cobalt/chromium casting alloy used for dentistry; composition and mechanical properties are laid down. A package of ingots claimed to comply with this standard must be marked with the name or trade mark of the supplier, the weight of the contents of the package, the batch number and the number of the standard. The BSI Kite-mark may also appear, if the manufacturer is licensed to use it. The presence of this mark on a product shows that BSI confirms that the product is up to standard. The standard does not relate to surgical implants. Copies of the standard may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1, price 3s. each, plus postage—to non-subscribers.

Wellworthy buys Wilmot Breeden Properties

Wellworthy, Limited, of Lymington, manufacturers or piston rings, etc., have brought the properties of Wilmot Breeden, Limited, of Bridgwater. Wellworthy will take complete possession on December 31, but partial possession will be given progressively not later than October 1. The properties comprise a site of 6½ acres and the factory buildings thereon and about 20 acres of industrial land for future development. It is intended that as Wilmot Breeden transfer their manufacturing plant Wellworthy will start their installation to keep continuity of production and employment. The move by Wellworthy has been necessary to keep pace with the growth of the industry at home and in the export markets and in the main is due to non-availability of labour in the Lymington area.

Research at Warren Spring Laboratory

When the Council for Scientific and Industrial Research set up the Warren Spring Laboratory in 1959 they aimed to provide a versatile laboratory, for the benefit of industry and Government departments, to carry out research which cannot be fitted into the programme of another research body. In reporting* on the Laboratory's first full year of operation in 1960, Sir Harry Jephcott, chairman of Research Council and of the Laboratory's steering committee, says that these research facilities are being used to an increasing extent. In the field of human sciences, the steering committee has agreed that, at least at first, work at Warren Spring should be mainly concentrated on ergonomics.

Atmospheric Pollution

A national survey is being carried out, in co-operation with local authorities, to provide detailed and accurate information about air pollution by smoke and sulphur dioxide throughout the country. Pollution measurements are being made at selected sites in towns chosen, on a statistical basis, as representative centres. Data already obtained show that from 1952 to 1959, the emission of smoke over the country as a whole decreased from an estimated 2,300,000 tons to 1,900,000 tons. In London, between 1953 and 1959, the emission of smoke was reduced from an estimated 152,000 tons to 82,000 tons.

"Bubble" Research

The chemical engineering division is carrying out basic research, which should lead to increased efficiency in gas-absorption and distillation equipment. Much of the work is concerned with the simple phenomenon of the bubble, and is aimed to find out, *e.g.* the mechanism of formation of bubbles, their surface area and, how and at what rate gas passes from a bubble into liquid? The division is also working on the problems of control of distillation equipment by computer.

Process Development

The Committee on Coal Derivatives which was set up by the Minister of Power, under the chairmanship of Mr. A. H. (now Sir Alan) Wilson, F.R.S., concluded that the synthesis of oils from coal is not likely to be economic in this country within the foreseeable future, and accordingly arrangements are being made to discontinue technological research at the Laboratory on the Fischer-Tropsch process. Allied work on catalysis is continuing, and during 1960 included an investigation of the relation between electric properties and catalytic activity of iron oxide (Fe_2O_3) containing small concentrations of titanium dioxide.

Mineral Processing

The mineral processing division is a centre of research for the mining industry at home and overseas and during 1960 about three-quarters of its work was on a repayment basis for industry and government. Experiments are being planned to explore the possibilities of introducing automatic control with mineral dressing plants.

High-tension Separation

The separation of minerals by high-tension electrical methods may be considerably extended as a result of the thorough investigation of this technique which has been started. Already some unexpected anomalies, not explained by existing theory, have been revealed.

* Report of the Warren Spring Laboratory: 1960. Published for DSIR by Her Majesty's Stationery Office, York House, Kingsway, London, W.C.2; price 3s. net, postage 4d.

East and West Ridings Industry

The East and West Ridings had the highest percentage of apprenticeships for boy school leavers in the country this year, the Regional Board for Industry was told by Mr. R. J. T. Card, regional controller for the Ministry of Labour at their meeting at Leeds on July 18. The region also held the same position last year, but this year, the percentage of boys gaining apprenticeships—46 per cent.—is higher. In the region about 30,000 boys and girls are expected to leave school this summer, an increase of 6,000 on last year. At 852,900, the region has its highest employment figure since 1948; unemployment is 0.8 per cent., and unfilled vacancies 34,000.

Mr. C. G. Birch, of the Export Credits Guarantee Department, told the meeting that there were about 1,000 firms exporting and making use of the department in the region. The annual export turnover was £144,000,000. Since the Department started its small-exporters scheme, 37 firms, previously casual exporters, were now exporting regularly, and 50 more had said that they would avail themselves of the Department's cover as soon as opportunity arose. A marked increase in the number of applications for industrial development certificates during June was noted in the report of the Board of Trade to the Board, a welcome feature being the emphasis placed on production layouts designed to increase productivity.

Labour Shortage

All industries of the region are now being affected by a growing shortage of labour, the report stated. It is now accepted that it is not easy to secure increases in output which require any substantial extra labour. The increase of competitive power requires close attention to increasing the productivity of labour. The report said, "More-progressive firms are tending to concentrate investment on plant and machinery which will meet these conditions. The prospects are that this process will intensify and may produce a "shake-out" of producers who are not fully equipped to cope with the situation."

Sewing Machines to be assembled in Ceylon

The Singer Sewing Machine Company—biggest importers of sewing machines to Ceylon—plans to set up a factory in Ceylon for which a two-acre site has been purchased in Ratmalana, near Colombo. The company, which last year sold 44,000 machines in Ceylon, expects production at the factory to reach 40,000 machines per annum.

Two other firms are also interested in setting up assembly plants for sewing machines. The Usha machine people plan to set up a plant either at Ratmalana or Jaela. Rs. 1,000,000 will be invested in this venture and the present plan is to turn out 1,000 machines a month. This will be a joint venture with Ceylonese.

The other firm is Steuart Engineers. The managing director, Mr. Marsh Dodanwela, said: "This will be a Ceylonese show. We intend to put in Rs. 500,000, and the likely site is Ratmalana. We will get technical know-how from PFAFF, the sewing machine principals in Germany." He added that over 60 per cent. of the parts of the machine will be turned out in Ceylon, while certain parts will be imported. This would mean a huge reduction in foreign exchange. The company hopes to turn out sewing machines cheaper than the present imported varieties.

Notes from the Branches

South Africa

At the conclusion of the annual general meeting, in May, of the South African branch of the Institute of British Foundrymen, the prizewinning papers in the Alexander Short Paper Competition were presented by the authors. Mr. G. C. S. Webster, who received the Alexander Medal for his paper entitled "Some Thoughts on Sand Control," said that the sand laboratory was often considered a necessary evil in a foundry, always assuming, of course, that sufficient interest had been shown in the first place to allow space and the nucleus of equipment to enable some method of testing to be carried out.

The smallest foundry, he went on, had need of sand control. The control might only be a method of checking the moisture periodically, but that in itself could almost be guaranteed to recover, in a matter of months, the cost of the equipment by the saving in scrap castings. The minimum equipment required for reasonable sand control, would allow tests to be carried out for moisture, permeability, green and dry strengths. This equipment would enable all normal routine tests to be done swiftly and accurately, so that in most cases the results could be available before a mould had been made.

Raw Materials

It was not always possible, said Mr. Webster, to test the sand before it was used for a job, as speed of production often allowed no time to wait for results of laboratory tests. Thus, sand control called for knowledge of the raw materials before they were mixed and delivered to the working place.

In order that prior knowledge of the properties of moulding materials might be determined, the author suggested equipment should be provided to test the raw materials before being released to the sand plant. The minimum equipment for this would be a means of checking the clay content, a nest of standard sieves and a shaker, also a fairly accurate balance. With this equipment, for calculating the AFS No., it would be possible to determine just what variations must be allowed in the standard mixes used in the foundry so that the physical properties laid down would be maintained. Mr. Webster strongly recommended installation of a small sand mill having about 20 lb. capacity, to enable experimental mixes to be made under controlled conditions.

High-temperature Testing

The author issued a warning on high-temperature testing of moulding sands. This type of testing, he said, helped to fill a gap in the information derived from tests carried out at room-temperature and the results obtained from actual castings. The results must, however, be treated with caution as no sand reacts when surrounded by a gaseous atmosphere, as it would when surrounded by molten metal. High-temperature tests would give a good indication of the spalling tendencies of a sand and its propensity towards cracking.

Constant Checking required

Maintenance of the required standards was the essense of successful sand control and, the author stressed, this could only be achieved by constant vigilance and constant checking of incoming raw materials. Naturally, the frequency of testing would be governed by the size of the laboratory staff. Where several trucks comprised one consignment, and it was impossible to test each truck individually; a sample representing three or four trucks should be taken and each truck inspected visually for any obvious deviations from the standard.

Liaison

The compounding of good moulding mixtures called for continuous liaison between sand laboratory and foundry personnel, stated the lecturer, and this implied an interchange of knowledge on both sides. Moreover, the interchange must be strictly honest as far as the available information was concerned. The author urged that sand laboratory staff should study rejects and, with the assistance of the foundry staff, record and catalogue the known reasons for such rejects.

He concluded his paper by advising foundrymen to use the binders best suited for their requirements, and, above all, to take an interest in the subject of sand testing, as an aid to the production of sound castings.

Foundry Planning

Mr. J. R. Walton, hon. secretary of the Natal section, was awarded the Alexander Prize for his paper entitled "Planning and Standardization in the Foundry." The paper was read on Mr. Walton's behalf by Mr. S. Jane.

Mr. Walton stated that efficiency in a foundry was governed in no uncertain way by production planning. To promote efficiency, the capabilities of existing plant must be fully extended and no new purchase should be considered until this had been achieved. Production planning, to be at all effective, must begin with the design of the casting. The author recommended that all designers should spend a certain amount of time in the foundry to assist them in appreciating the practical problems involved in the moulding of a pattern.

Standardization

The function of the planner in a foundry, Mr. Walton continued, should be to provide for standardization so far as was practical. It was a common failing for the drawing office to give different dimensions to similar parts on account of the various sizes of the completed unit. For discrepancies of this nature the planner must be on the alert. His duty was to arrange for each job to be made in such a way that the minimum amount of work would be necessary in the final assembly. Still on the subject of standardization, the author made a plea for the standardization of moulding boxes in each foundry as regards size and quantity.

Production Planning

In conclusion the author said that the art of planning was not easily acquired, and in the case of older-established businesses, not readily acceptable; the planner, himself, would be regarded as an "upstart who knows nothing much." He must, therefore, proceed with the utmost caution, ensuring that every stage of operation was carried out with the full assistance of the foundry personnel.

After both papers had been presented, the president, Mr. D. Gordon Jones, concluded the discussion which followed by calling on one of the members to propose a vote of thanks.

Australia (Victoria)

The lecture at the June meeting of the Australia (Victoria) branch entitled "Recent Developments in Foundry Sands and their Processing," was given by Mr. K. Ward, an associate member of the Institute and technical consultant for the Standard Chemical Company. Mr. Ward detailed applications of the newer types of sands and outlined uses of bentonites, wood flours, CO_2 additives, air-setting corebinders, bentones and furan resins. Also in June the branch held a very successful students' prize and award night.

British Standard for Notched Bar Tests: (B.S. 131: Part 1 :1961)

A new British Standard, which deals with the Izod impact test on metals, is published as Part 1 of a revision of B.S. 131. (Part 2, published in 1959, deals with the Charpy V-notch test.) The scope of the standard has been widened to include details of the method of test with structural and dimensional requirements for the testing machine. Whereas the former edition of the standard gave only nominal dimensions of test-pieces, the new edition gives dimensions with appropriate machining tolerances. The tolerances for ferrous test-pieces are in accordance with a recommendation of the International Organization for Standardization, but for non-ferrous metals a more restrictive tolerance has been applied to the dimensions of the test-piece. The structural and dimensional aspects of the testing machine are fully dealt with and an appendix gives recommendations for its installation. Copies of the standard may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1: price 6s. each plus postage.

Britain and Russia to increase Trade

An agreement has been reached between Britain and Russia that it is "appropriate to take further steps to increase trade" between the two countries, according to a communiqué issued at the end of talks between Mr. Reginald Maudling, President of the Board of Trade, and Mr. Patolichev, the Soviet Minister of Foreign Trade, who was in London on the occasion of the Soviet Exhibition.

The Ministers also agreed that the negotiations for an Anglo-Soviet Treaty of Commerce and Navigation will be resumed in London at the end of this year or early in 1962. They welcomed the success of the British Trade Fair in Moscow and "took note that a substantial volume of Soviet orders for British goods had been placed on that occasion." (The recent Soviet Exhibition in London was equally successful.)

The communiqué added that Mr. Maudling has started consultations with a number of industries in this country about the possibility of concluding contracts for the supply of Soviet goods to the UK.

Kestner Evaporator & Engineerings' New Foundry

Last month, the president of the Kestner Evaporator & Engineering Company, Limited, of London, unveiled a plaque to commemorate the inauguration of their new foundry at Greenhithe. This foundry is the first part of the complete move of the firm's works from New Cross to Greenhithe. Other shops that will be transferred will be the Keebush production and machine-shop, grinding, pump assembly and test shops, Keeglas and PVC fabrication, general and heavy plant-erection, and finally the general laboratory, pilot plant, and test laboratory departments. A new drawing office is being built to house a staff of 60. On completion the factory floor-area will be some 100,000 sq. ft. and the move will be completed in about six months.

The new foundry is making castings of Tantiron (the company's acid-resisting high-silicon iron) and lead-alloy acid-resisting castings. Five furnaces have been installed, giving an output of 10 tons of castings per week, and there is room to increase this plant to double the output.

Tantiron Foundry at Greenhithe of Kestner Evaporator & Engineering Company, Limited, showing four of the five furnaces available for melting. The castings produced are used principally for acid-resisting pump parts.

News in Brief

CHAMBERLAIN INDUSTRIES, LIMITED, of Staffa Works, Argall Avenue, Leyton, London, E.10, have appointed Mr. ENRIQUE LAFRENZ as their sole agent to represent them in the Argentine Republic and Uruguay.

PLENTY & SON, LIMITED, ironfounders, engineers, marine-engine, pump and mixing-machine manufacturers, of Newbury, Berks., are reported to have exported approximately £500,000 worth of equipment incorporating their own castings over the past year.

CZECHOSLOVAKIA HAS PLACED with Norton Motors, Limited, of Birmingham, an order for £30,000 worth of motor cycles—the fifth successive order for Nortons within the past two-and-a-half years and bringing the total value of this Czech business to more than £90,000.

A 30-YD.-LONG STEEL TUBE being transported on three trailers hauled by a lorry from the Sheepbridge Works to Newcastle caused the lorry to sink 18 in. into the road at Owler Bar, near Holmesfield, Sheffield. The tube weighed 75 tons and stood about 20-ft. high on the lorry.

TAYLOR'S BELL FOUNDRY, Loughborough, has recast the bells of Southwell Minster, and made the eight bells into a peal of 12. The old bells had been in place since 1721. Sir Stuart Goodwin, the Sheffield industrialist, donated £5,000 towards the cost of recasting the bells.

NICKEL and nickel-alloyed materials are expected to respond to the 10 per cent. increase in the base price of nickel posted by the International Nickel Company. Inco blames increased labour costs and operating costs as responsible for the rise which is announced after 4½ years of price stability.

A SYMPOSIUM ON CORROSION in the Nuclear-energy Industry has been organized by the *Société de Chimie Industrielle*, 28, rue Saint-Dominique, Paris, 7, and will be held on October 19 and 20 at the Maison de la Chimie, with Mr. M. F. Perrin, High Commissioner for Atomic Energy, presiding.

BRITAIN HAS BECOME the largest importer of ships according to figures published last week by Lloyd's Registrar of Shipping. Tonnage being built oversea for Britain and Northern Ireland rose to a record 693,471 tons at the end of June. At the end of March the figure was 457,000 tons.

DURING THEIR two-day visit to Northern Ireland on August 8-9, the Queen and the Duke of Edinburgh will visit the factory of International Computers & Tabulators, Limited, Castlereagh, the Belfast shipyards of Harland & Wolff, Limited, and the Government training centre and rehabilitation unit at Felden, where disabled ex-servicemen are trained for industry.

IN TOTAL STEEL output in the first half of 1961, Japan outstripped Britain to take fourth place after the US, the Soviet Union, and West Germany, according to a report by the Japan Steel Exporters Association. The report stated that Japan's steel production in the period totalled 13,225,000 tons, compared with 12,415,000 tons for Britain.

THE EXECUTIVE COMMITTEE of the Lorry Mounted Crane Association agreed at the July meeting to adopt the standard signals for crane operatives drawn up recently by the Federation of Civil Engineering Contractors and they have recommended members to display a card, illustrating the signals, inside the cab of every lorry-mounted crane.

THE KITCHENS of the Royal Teheran Hilton Hotel—destined to be a show-piece of modern Iran—will have equipment made by Allied Ironfounders, Limited. The special equipment to meet this new contract will be made in Falkirk, Stirlingshire, and Sheffield. The company recently announced receipt of an order for kitchens in the National Iranian Oil Company's Teheran head office.

Mr. R. JARDINE, chairman of the Sheffield Smelting Company, Limited, unveiled, on July 26, a plaque on new buildings being erected adjacent to their premises at Attercliffe. The buildings are on a three-quarter of an acre site at the junction of Royds Lane and Princess Street. The development, which has been made necessary by the increased demand for many of the firm's products, is expected to be completed next Spring.

TOTAL GAS SALES in the area of the East Midlands Gas Board went up by 6.34 per cent. last year. Domestic sales increased by 7.9 per cent., industrial sales by 5.5 per cent., and commercial sales by 6 per cent. The number of consumers increased by just over 6,000. Total value of appliances sold was £4,371,000, an increase of £100,000 on the previous year. Sales of gas-fire and other space-heating appliances went up by 42.9 per cent.

SHEFFIELD STEEL INDUSTRY had 504 vacancies on July 20—73 more than a month earlier. Engineering vacancies at 236 had increased by 13. The Ministry of Labour figures on that date showed 1,015 men wholly unemployed—a fall of 32 in the month. Women out of work numbered 364—a reduction of 29. The total of 1,379, plus 61 listed as being on short time, is the lowest since October 1957 and is equivalent to a rate of 0.55—well below the national figure.

JOY-SULLIVAN, LIMITED, announce a new division to handle the design, construction and installation of electrical and mechanical precipitators. The move is the result of the merging, in 1959, of Western Precipitation Corporation of Los Angeles with Joy Manufacturing Company, of Pittsburgh, parent company of Joy-Sullivan, Limited. The general manager of the new Western Precipitation division is Mr. Kenneth H. Cree and the sales office is at 7, Harley Street, London, W.1.

THE LICENCE AGREEMENT between Brown-Boveri, Limited, and Richardsons Westgarth, Limited, covering the manufacture and sale in the United Kingdom of steam and gas turbines, turbo alternators, blowers and compressors to Brown-Boveri design has been terminated by mutual agreement for reasons beyond the control of either party. As a result all thermal equipment as described above will be offered solely by British Brown-Boveri, Limited, 75, Victoria Street, London, S.W.1, and manufactured by them.

TWO EXHIBITIONS OF LABORATORY EQUIPMENT are being staged by the Griffin & George group in September at Cardiff and Manchester. The Cardiff exhibition will be held in the Welsh College of Advanced Technology, Cathays Park, from September 12 to 14, and the Manchester one at the Chorlton Town Hall, Cavendish Street, from September 18 to 21. Enquiries should be addressed to the group's regional service centres at Birmingham (Mr. C. J. Passmore), and Manchester (Mr. D. F. Savage) respectively.

RECENTLY, a private-wire teleprinter communications system was placed into service in the UK by Aluminium, Limited, of Canada (Alcan). Supplied by Creed & Company, Limited, of Croydon, the new system provides high-speed, accurate, two-way communication between 24 offices of Alcan and its asso-

News in Brief

ciates, and is designed initially to handle several thousand business messages weekly. It also connects, *via* the trans-Atlantic cable, with the Montreal centre of Alcan's extensive North American teleprinter network.

FOLLOWING THE DECISION of a large Oslo bank to accept a substantial first mortgage and two previous mortgages granted by Horten town council and an insurance company, the financing of the new car factory —to be established in Norway by British industrialist York Noble—is now reported to be secured. The plant, to be constructed at the town of Horten on the Oslo Fjord, is designed to turn out a small car to be called "Noble Viking," with a plastic body and a German 300 cc Sachs motor, and which will be the first motor car to be manufactured in Norway.

SHEFFIELD UNIVERSITY is to run a series of lectures for those concerned with foreign sales. The series of 12 weekly sessions will be given by Mr. E. K. Hawkins, lecturer in economics at the University, and will start in the autumn. Numbers will be restricted so as to provide ample opportunity for discussion. The lectures will fall under three main headings—the special problems of international trade; British interests in international trade; and the institutions of international trade. Implications of the Common Market for Britain and the Commonwealth, and the "Six" and the "Seven" will be dealt with.

HOVERINGHAM ENGINEERING COMPANY, LIMITED, has been sold by Hoveringham Gravels, Limited, Nottinghamshire, to Aveling-Barford, Limited, of Grantham, Lincolnshire, for about £300,000. Hoveringham Gravels will now concentrate entirely on their sand and gravel interests; part of the agreement provides for the company to obtain all its gravel plant for the next 10 years from the Aveling-Barford group of companies. The Hoveringham Engineering Company, which makes structural steelwork, colliery surface plant, conveyor systems and mechanical-handling equipment, will continue to operate under its own name.

CONTRACT VALUED at approximately £53,000 for overhead travelling cranes has been gained by S. H. Heywood & Company, Limited, of Manchester. Awarded by Richard Thomas & Baldwins Limited, the contract covers one 20-ton and nine 5-ton electrically-driven overhead travelling cranes, 70-ft. span, complete with electrical equipment for standard a.c. supply. The 20-ton crane will be equipped with an operator's cage, and the 5-ton cranes arranged for travelling pendant push-button control. The cranes are for installation at the plant of H. F. Spencer & Company, Limited, New Warehouses, Fordhouses, Wolverhampton.

A DUNDEE ENGINEERING FIRM, Robert Kellie & Son, Limited, a subsidiary of the Vokes group, have secured a contract worth nearly half a million pounds from the Russian Government. The order is for the supply of equipment for a large potato store and the contents of a complete factory to produce and pack potato crisps, pre-cooked and deep-frozen potato chips, and potato cakes. The contract has been settled after 10 months of negotiations and four visits to Moscow by Mr. H. F. Osborne, managing director of the Vokes group; and Mr. A. J. F. McDonald, director, and Mr. A. Coleman, project engineer, of Robert Kellie & Son.

JOHN DALGLISH & SONS, LIMITED, engineers, Glasgow, have signed a contract with Russia for the supply of machinery worth about £1,500,000. The company, are to deliver between July and December, 1962, two complete plants for the filtration, drying, wrapping and packing of Butyl synthetic rubber. This contract follows an order by Russia in March of two contracts for Butyl synthetic rubber, valued at approximately £200,000. At the end of 1959 Dalglish announced a contract with Russia worth more than £500,000 for the supply of a complete plant for drying and packaging "G.R.S." synthetic rubber. Delivery of this machinery was completed several months ago.

A COURSE OF 12 LECTURES, the second of a two-part course, on "Electronic Computing Systems," intended for executives and others interested in the commercial applications of electronic computers, will be given on Wednesday evenings, beginning January 17, 1962, and ending February 21, at the Sir John Cass College, Jewry Street, Aldgate, London, E.C.3. Two lectures will be given each evening, the first from 6.15 to 7.15 p.m. and the second from 7.30 to 8.30 p.m. The fee for the course for those residing in the Administrative County of London is £1. Further details and enrolment forms may be obtained by writing to the secretary of the College at the address quoted.

Mr. J. G. GEORGE, Parliamentary Secretary, Ministry of Fuel and Power, inaugurated on July 19 a series of open days at the new laboratories of the department of fuel technology and chemicals at Sheffield University. At a luncheon in the Mappin Hall, Mr. George said "The only way open to us greatly to increase our gross national product is to employ people more efficiently. Greater productivity grows from greater efficiency. It is essential that applied science should advance in harmony and balance with pure science. It is of little avail if the results of research are not translated into improved plant and processes." Among exhibits visitors have seen "RAT," (Robot Adaptive Troglodyte), an automatic boilerman which, powered by a battery, can do a range of jobs from shovelling coal to putting out a fire.

THE NORTHERN EXHIBITION OF FUEL AND POWER is to be held in the new Queens Hall, Leeds, from October 18 to 27, and will be opened by the Minister of Power, the Rt. Hon. Richard Wood, M.P. Although for many years there has been a strong feeling that many industrial exhibitions of this type should be brought to the North, the absence of suitable premises with the requisite floor capacity and amenities has been a formidable obstacle. With this in mind, Modern Exhibition Services, Limited, has, only this year, taken over and developed the Queens Hall as an entirely new exhibition venue for the North. By virtue of its vast floor area—about 100,000 sq. ft.—it promises to become one of, if not the most, important exhibition centres in the country. It is already heavily booked for a long period ahead.

Obituary

Dr. E. HAMMOND, technical manager of Lafarge Aluminous Cement Company, Limited, died on July 4.

The death occurred on July 20 of Mr. F. RABY JOLLEY, formerly managing director of Simon Handling Engineers, Limited, Cheadle Heath, Stockport. He retired last year after 47 years with the Simon group.

Mr. E. L. PIPE of F. W. Berk & Company, Limited, has died at the age of 50. He joined the company in January 1937 and since 1946, after war service, had continuously represented the company in the foundry industry. He was well known in foundry circles, particularly the Midlands, South Wales and the West.

Raw Material Markets

Iron and Steel

Between now and the end of August, annual holidays will affect production of castings at the iron foundries, as most establishments will be closed for a fortnight during that period. In the Birmingham and South Staffordshire areas practically the whole of the industry will be shut down from July 28 until August 14, during which time essential repairs and alterations to buildings and plant which may be found necessary will be undertaken.

There is little change in the trend of business for iron castings, and most producers would welcome an improvement in their order-books, particularly for forward commitment. The engineering and speciality foundries, most of which up to the present have been favourably employed, report an easing in the current demands for high-duty castings from some trades, including the motor-vehicle industry, machine-tool makers, and other users. Up to now these foundries have been able to maintain a normal five-day-week production, but outputs at many units are now in excess of current business, resulting in decreasing order-books, and unless this position improves it will be difficult to obtain recent production levels.

Most of the light foundries are still striving to improve their production. Business from the domestic utensil trade remains moderate, and insufficient to enable these foundries to increase their outputs. Demands for builders' castings and also for cast-iron pipes are well maintained. Most of the light foundries, however, could undertake more work than is at present available, and efforts are made by some of them to accomplish this by producing castings for other trades. The jobbing and textile foundries are moderately employed.

During the holiday period, deliveries of raw materials generally will be suspended. The foundries are well provided with supplies of pig-iron, and apart from the tonnages they have in stock, no difficulty will be experienced in obtaining additional supplies promptly when they resume work, as all grades are plentiful. Arisings of scrap, apart from special qualities, are also adequate, and coke, ganister, limestone, and firebricks are available on demand.

In a few cases rolling mills producing heavy sections and joists will find a modest accumulation of orders awaiting them on their return from holidays, but these will be hardly sufficient to justify a resumption of full-time working. Plate for the engineering industries represents a steadier, though still subdued market compared with conditions a few months ago. On structural work the demand for universal beams is still good and is ample to ensure full-time working at the still limited capacity allocated to this type of product.

Consumers of finished steel are able to get quick deliveries of almost anything they need, and this is not only a sign of the restricted demand of the moment, but also of the expanding capacity of the industry which, for all practical purposes is well ahead of consumption.

There is a quieter tone in the market for reinforcing rods and also for billets, which are not being absorbed in such large tonnages by the re-rollers of light steel products.

Non-ferrous Metals

In spite of increasing tension in international relations and the introduction of new financial measures in the UK, non-ferrous metal markets have remained surprisingly unaffected. However, copper has been firm on both sides of the Atlantic due largely to the rejection of Anaconda's wage offer to the workers at the Chilean mines, and to the optimistic outlook for the metal forecast in the half-yearly statement issued by the Kennecott Copper Corporation.

The half-yearly statement from Kennecott makes the point that demand for copper has improved in recent months and is directly attributable to the better economic conditions in the United States. In this connection it is worthwhile noting that President Kennedy's decision to step up defence spending could lead to a substantial demand for copper. Meanwhile the LME quotation is headed for £235 a ton while the US price is unchanged at 31 cents a pound.

Tin remains steady with the price continuing to rise. The market is more notable for its absence of sellers than for any great weight of demand. Singapore is also firm and, New York, like London, is going ahead quietly. The US price is around $1.17 a pound.

The outlook is still good but not much interest is expected to develop in the metal before the next meeting of the International Tin Council in London on August 22. There has been no further news about the proposed releases of tin from the US stockpile.

Holiday influences are strong on the lead market in London and New York and neither centre is doing much business. In London the price is moving narrowly around £65 a ton. In the US the quotation is unaltered at 11 cents a pound. Zinc is also a lethargic market both here and in the US. The LME price is fairly steady around £78 a ton and the US price is unchanged at 11½ cents a pound.

House Organs

Incandescent Group Review, Vol. 1, Nos. 1 and 2, issued quarterly by the Incandescent Group of Companies, Smethwick, Staffs.

This is a new house organ, published specifically for Incandescent staff. Rightly, the first issue opens with an introduction by the chairman, Mr. John Fallon, O.B.E., J.P., M.I.MECH.E. The first article deals with the group's special alloys division, Thompson L'Hospied, at Stourbridge, where superstitions of French origin still persist, one of which is that a pattern must not be removed from the foundry before a casting is taken from the mould. A feature of this new magazine, which the writer deems to be good "copy," is the way it deals with out-of-the-way doings of members of the staff. There are recorded the usual reports of weddings, deaths, presentations on retirement, and indoor sporting activities, but apparently neither cricket nor football is played.

Ruston Review and Paxman News, No. 7. Published by Ruston & Hornsby, Limited, Lincoln.

That the romance of engineering is not a thing of the past is shown in this house organ which carries the story of the raising of the Swedish warship, Vasa, which was built in 1628 and has been lying at the bottom of Stockholm harbour ever since. A second article describes the first coming of mechanical power to a group of South Sea Islands comprising the New Hebrides, which are under Anglo-French condominion and are known to few people outside stamp collectors and visitors to Cinerama. As usual the magazine provides most interesting reading.

MINERALS MINED in Southern Rhodesia in the period January-May, 1961, valued over £11,000,000—a 5¼ per cent. increase over the first five months of last year. According to the Southern Rhodesian Department of Mines, principal minerals raised in May were worth £2,255,659.

Current Prices of Iron, Steel, and Non-ferrous Metals

(Basis prices, delivered unless otherwise stated. Prices following side headings marked* are subject to an increase of 1 per cent. under Iron and Steel Board Price Determination, 1961, No. 2.)

August 2, 1961

PIG-IRON

* **Foundry Iron.**—No. 3 IRON, CLASS 2, 10-ton lots or over, Middlesbrough, £21 17s. 0d.; Birmingham, £21 9s. 3d.

* **Low-phosphorus Iron.**—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham; £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

* **Hematite.**—Si less than 2 per cent, S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 9s. 0d.; Birmingham, £25 13s. 0d.; South Wales (Welsh iron), £23 19s. 0d.

* **Basic Pig-iron.**—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(per ton unless otherwise stated, delivered)

Ferro-Silicon (6-ton lots and over).—45 per cent. Si, £45 0s. 0d. to £48 0s. 0d., scale 15s. 0d. per unit, lumpy, 75 per cent. Si, £62 0s. 0d. to £66 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s.10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 10s. 3d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 13s. 3d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £81 10s. 0d. to £84 10s. 0d., basis 60per cent. Cr scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr.; 0.10 per cent. C,* 1s. 9¾d. to 2s. 0¾d. per lb. Cr; 0.06 per cent. C,* 1s. 11d. to 2s. 1d. per lb. Cr. * Average 68-70 per cent.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £275 0s. 0d.; 96/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent. Cb + Ta, 19s. 0d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £58 10s. 0d.

SEMI-FINISHED STEEL

* **Re-rolling Billets, Blooms, and Slabs.**—BASIC: Soft u.t., 100 tons and over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 100 tons and over, £32 5s. 6d.; hard (0.41 to 0.60 per cent. C), 50 tons and over, £33 17s. 0d.; silico-manganese, 50 tons and over, £42 16s. 6d.; free-cutting, 50 tons and over, £35 4s. 6d. SIEMENS MARTIN ACID (50 tons and over): Up to 0.25 per cent. C; £40 11s. 0d.; silico-manganese, £43 4s. 0d.

* **Billets, Blooms, and Slabs for Forging and for Stamping** 50 tons and over).—BASIC: Soft, up to 0.33 per cent. C, £37 0s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £38 2s. 6d.; acid, up to 0.25 per cent. C, £41 14s. 0d.

FINISHED STEEL

* **Heavy Plates and Sections** (50 tons and over).—Ship plate (N.-E. Coast), £40 7s. 0d.; boiler plates (N.-E. Coast), £42 17s. 0d.; floor plates (N.-E. Coast), £41 16s. 0d.; angles (N.-E. Coast), £38 1s. 6d.; joists (N.-E. Coast), £37 17s. 6d.

* **Small Bars, Sheets, etc.**—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 6d.; under 4 tons to 2 tons, £41 3s. 6d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 4s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £67 16s. 0d.; nickel-chrome, £100 18s. 0d.; nickel-chrome-molybdenum, £113 11s. 0d., in lots of 25 tons and over.

NON-FERROUS METALS

Copper.—Cash, £230 0s. 0d. to £230 5s. 0d.; three months, £232 15s. 0d. to £233 0s. 0d.; settlement, £230 5s. 0d.

Copper, Tubes, etc.—Solid-drawn tubes, 2s. 2¾d. per lb. rods, 245s. 6d. per cwt. basis; 20 s.w.g., 280s. 6d. per cwt.

Tin.—Cash, £921 0s. 0d. to £921 10s. 0d.; three months £932 0s. 0d. to £932 10s. 0d.; settlement, £921 10s. 0d.

Lead (Refined Pig).—First half August, £65 0s. 0d. to £65 2s. 6d.; first half November, £66 0s. 0d. to £66 2s. 6d. settlement, £65 2s. 6d.

Zinc.—First half August, £77 15s. 0d. to £78 0s. 0d.; first half November, £78 12s. 6d. to £78 17s. 6d.; settlement, £78 0s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £116 12s. 6d.; rolled zinc (boiler plates), all English destinations, £114 7s. 6d.; zinc oxide (Red Seal); d/d buyers' premises, £92 1s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 9¾d. per lb.; sheets to 10 w.g., 198s. 9d. per cwt.; wire, 2s. 8½d.; rolled metal, 198s. 9d. per cwt.

Brass (Brazing).—BS1400, B3, £177; B6, £223.

Brass (High Tensile).—BS1400, HTB1, £194; HTB2, £215; HTB3, £230.

Gunmetal.—BS1400, LG2, £219; LG3, £228; G1, ½%, £298; G1, 1%, £288.

Phosphor Bronze.—BS1400, PB1 (AID released), £314; BS1400, 90/10/1, £303.

Leaded Phosphor Bronze.—BS1400, LPB1, £241.

Phosphor Bronze Strip, etc.—Strip, 296s. 3d. per cwt.; wire, 4s. 1¾d. per lb.; rods, 3s. 4¾d.; tubes, 3s. 4¾d.; chill cast bars, solids 3s. 4¾d.; cored, 3s. 5¾d. (CHARLES CLIFFORD LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 11¾d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 4¾d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 3¾d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 2¾d. to 2s. 3d. per lb.; Antimony, English, 99 per cent., £230 0s. 0d. Quicksilver, ex-warehouse, £64 0s. 0d. Nickel, £660 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £243; AB2, £251.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.)

840,919. Midland Silicones, Limited, 68 Knightsbridge, London, S.W.1.

A composition for the fabrication of foundry moulds and cores which comprises: (1) a preponderant proportion of sand, (2) a core oil binder in the proportion of from 1 to 4 per cent. by weight, calculated on the weight of the composition, and (3) a small proportion of from 1 to 15 per cent. by weight, calculated on the weight of the core oil, of a partial hydrolysate of an alkoxylated mixture of by-produced chlorosilicon compounds obtained from the reaction of methyl chloride and silicon containing at least 3 per cent. by weight of silicon bonded alkoxy groups and an average of from 0.9 to 1.2 per cent. monovalent hydrocarbon atoms per silicon atom as an organosilicon additive in the composition.

841,143. Badische Maschinenfabrik, A.G., Seboldwerk, Karlsruhe-Durlach, Germany.

Method of, and apparatus for, lifting upper and lower box moulds off a patternplate, and conveying away the finished box in turntable foundry moulding machines.

845,340. Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland, 14, Ohio, USA.

Improvements in jolt moulding machines, in particular those designed for the production of green-sand moulds. It is hoped that by this invention better, and more uniform, compacting of the sand will be obtained.

845,346. Herman Pneumatic Machine Company, Union Bank Building, Pittsburgh, 22, Penna., USA.

Jolt- and squeeze-operated machines for forming foundry moulds. (See also Patent No. **845,172,** FOUNDRY TRADE JOURNAL, July 13, 1961.) It is a feature of this Patent that wear on parts of the apparatus is stated to be capable of being reduced, and the difficulties involved in accomplishing simultaneous jolting and squeezing can be overcome.

846,178. A. B. Svenska Kullagerfabriken, 17 Artillerigaten, Gottenburg, Sweden.

Improvements in vacuum-casting methods, which have the object of removing or reducing the difficulties arising in this type of process, from solidification when molten metals pass through small holes.

846,285. Regie Nationale des Usines Renault, 8/10 Avenue Emile Zola, Billancourt (Seine), France.

Methods for casting cast iron under pressure. (See also Patent No. **742,400.**) According to this invention the process comprises producing a primary mould by sintering an alloy, and using this for producing secondary moulds by injection under pressure of an alloy. These secondary moulds serve for the casting under pressure of iron castings, the alloy used for them being more refractory than the material used for the iron castings. The alloy used for the primary moulds is more refractory than that used for the secondary moulds. When the secondary moulds have deteriorated the material can be recovered by remelting.

846,295. Friedrich Trindler, 16 Bachtalstrasse, Baden, Switzerland.

The manufacture of ring-shaped castings by centrifugal casting techniques.

PIG IRON, **All Grades**
METALLIC ABRASIVES
SHOTBLASTING MACHINERY
FOUNDRY MACHINERY

WILLIAM
JACKS
AND COMPANY LIMITED

HEAD OFFICE
WINCHESTER HOUSE
OLD BROAD STREET
LONDON EC2
LONdon Wall 4774

And at:
BIRMINGHAM 5
Lic' field House,
Smallbrook Ringway
Midland 3375/6

GLASGOW C2
93 Hope Street
Central 9969

FERRO SILICON 12/14%
ALLOYS & BRIQUETTES
FOUNDRY COKE
LIMESTONE
GANISTER
MOULDING SAND
REFRACTORIES

Company News

Colville's Share Proposals Approved

Shareholders of Colvilles, Limited, the steel and iron company, recently approved the proposed issue of 5,324,906 new ordinary £1 shares on a rights basis of 57s. 6d. each, with rights to the Ordinary and 6 per cent. Convertible debenture holders. Sir Andrew McCance, chairman, told the meeting that the issue had been very carefully considered by the directors in the light of the company's present situation, and the board was of the opinion that it was clearly in the interests of the company to proceed with it, in accordance with arrangements already made.

This view, said Sir Andrew, had received substantial support from the shareholders, as the proxies which he held for the meeting were "overwhelmingly in favour" of the proposal. "This has been particularly gratifying to the board, since the general market conditions today are somewhat different from the conditions which existed at the time the decision to proceed with this issue was made." Temporary fluctuations in market conditions, the chairman declared, did not affect the long-term prospects, and so far as Colvilles was concerned the long-term prospects were good.

Fall in Profits for GEC

Gross sales income of the General Electric Company, Limited, increased from £116,900,000 to £118,600,000 in the year ended March 31, 1961, but profits contracted sharply. Preliminary results show trading profits down from £4,530,766 to £2,892,209 and the group net profit of £1,377,677 compares with £2,532,384 of which £1,094,801 against £2,322,135 is attributable to the holding company.

Two factors, state the directors, were mainly responsible for the reduction in profits. In the first place, margins in the heavy engineering industry were "meagre" and contributed little to the year's earnings. Secondly, the extremely unsatisfactory state of trade during the year in the radio, television and domestic equipment industries resulted in substantial losses.

Dividends totalling 10 per cent. (same) have been paid for the year on the £18,000,000 Ordinary.

HOLMAN BROS., LIMITED, manufacturers of mining, quarrying and pneumatic plant, etc., of Camborne (Cornwall)—Final divided is being halved to 4 per cent., making, with the unchanged 4 per cent. interim, a total of 8 (12) per cent. for the year to March 31, 1961. Group net profit attributable to the company fell to £132,538 (£162,999) after tax of £138,820 (£161,940).

ALFRED HERBERT, LIMITED, machine-tool makers, of Coventry (Warwicks)—Orders from home and overseas markets continue to be received at a satisfactory level and there is good reason to expect that profits for the current year to October 31, 1961, will not be less than those for last year. An interim dividend of 2½ per cent., tax-free, is maintained. It was followed last year by a final of 6 per cent. tax free.

HATTERSLEY (ORMSKIRK) LIMITED, textile engineers, of Ormskirk (Lancs)—At the annual meeting, Mr. H. C. Nicholson, chairman, said it is intended in the near future to make a share exchange offer for the 112,500 ordinary 10s. shares not already owned by the company in its subsidiary, Beck & Company (Meters), Limited. Hattersley's present holding amounts to 75 per cent. of the ordinary. For the first three months of the current year, sales of Hattersley compared very favourably with those of a year ago, although margins, through increased costs, were showing no improvement.

Translation Services

From amongst the most recently published lists of translations available from the Iron & Steel Institute (4, Grosvenor Gardens, London, S.W.1), the following have been selected as being of interest to founders. The price quoted is that for single copies, postage extra, there being reductions for quantities ordered. Readers writing for translations, or for further information, should mention this JOURNAL when doing so.

BISI 2117 MELTING, CASTING AND HEAT-TREATMENT OF FULLY-AUSTENITIC CAST NICKEL-IRON-CHROMIUM ALLOYS CONTAINING MOLYBDENUM AND COPPER. (From German.) Roesch, K., and K-H. Schmitz. *Giess. Tech. Wiss.*, 1961, *13*, Jan., 43-55. (£8.)

BISI 2304 EFFECT OF MANGANESE CONTENT ON INGOT-MOULD LIFE. (From German.) Kiesel, K-L. *Neue Hütte*, 1961, *6*, May, 284-291. (£3 15s.)

BISI 2315 SPECIFICATIONS FOR STANDARD DIMENSIONS OF THREE-PHASE MOTORS FOR INTERMITTENT SERVICE IN IRON AND STEELWORKS. (From German.) Schönig, H. *Stahl Eisen*, 1956, *76*, Oct. 4, 1290-1292. (£2.) The author discusses the standardization of motors for intermittent operation as in cranes. The new German series of motors have standard overall dimensions for each type and cover the range 4-200 kw at 1,000, 750, and 600 r.p.m. (*JISI* abstract, 1957, May, 129.)

New translations in course of preparation include:—

BISI 2323 NOISE LEVEL IN STEELWORKS. (From German.) Jansen, G. *Ibid.*, 1961, *81*, Feb. 16, 217-220.

BISI 2330 SOLUBILITY OF BASIC CONVERTER SLAGS IN CITRIC ACID. (From French.) Decker, A., *et al. Rev. Univ. Mines*, 1956, 9th series, Dec., 652-660.

BISI 2353 ON A NEW METHOD OF MEASURING DUST. (From German.) Winkel, A. *Staub*, 1959, *19*, July 1, 253-255.

The following translations are available from Mr. H. Brutcher, Technical Translations, P.O. Box 157, Altadena, California, USA:—

HB 5180 INVESTIGATION OF CAST AGAINST FORGED HEAT-RESISTING STEEL. Kolobashkin, B. M. *Lit. Proizv*, 1960, Dec., 34-36.

HB 5200 CONTROL OF CUPOLA MELTING. Patterson, W., and F. Neumann. *Giesserei*, 1961, *48* (3), 49-56.

HB 5206 EFFECT OF CASTING TEMPERATURE ON SHRINKAGE CAVITIES IN LIGHT-SECTION STEEL CASTINGS. Málek, M. *Slévárenství*, 1959, 7 (12), 477-483.

HB 5208 EFFECT OF TAPPING SLAG ON THE CONTAMINATION OF STEEL BY NON METALLIC INCLUSIONS. Danilov, P. M., and L. N. Karachentseva. *Izvest. VUZ-Chern. Met.*, 1961 (4), 59-66.

New translations, now in preparation, which will be included in the BISI Translation Service if more requests are received include:—

E 2336 DEGASSING OF LIGHT-METAL ALLOYS BY SOUND VIBRATIONS. (From German.) Esmarch, W., *et al.* Wissenschaftliche Veröffentlichungen aus den Siemens Werken Werkstoff-Sonderheft, 1940, 78-87.

E 2354 FLOW OF GRANULAR MATERIAL THROUGH A CIRCULAR ORIFICE. (From French.) Durand, R., and E. Condolios. *Travaux*, 1956, *40*, Mar., 113-116. Flow aspect. Effect of the shape of the bottom of the silo. Mass flow given by a circular discharge orifice. Influence of the weight of material on mass flow. Effect of the dimensions of the orifice and of the material on mass flow. (Contents List.)

When sending requests, please state whether (*a*) you would like to buy a copy (or copies) of these translations if they are included in the Service; (*b*) a translation already exists.

Welded Steel Fabrications. Old Park Engineering, Limited, Holly Hall, Dudley, Staffs, have issued a handsome brochure which stresses the competition which the makers of welded steel fabrications can impose against castings. Amongst items illustrated in the brochure are a press frame weighing 32 tons; a frame for a stone crusher; a frame for a tyre press; a gearbox of large size, and a furnace charging bucket weighing 13¼ tons. The company issuing this brochure is a subsidiary of Tube Investments, Limited, and the publication is of the same high quality as that usually emanating from this group

Publications Received

Research for Industry—1960. Published for the Department of Scientific and Industrial Research, by Her Majesty's Stationery Office, Kingsway, London, W.C.2; price 8s. 7d. post free.

The short reports in this publication from about 51 individual research associations are such that the individual reader is only really interested in a maximum of, say, four—foundrymen will be interested in the three which cover the manufacture of castings and perhaps one more. In addition to the report of the Industrial Grants Committee, and a series of reviews of achievements of the various research associations, four articles on communal and industrial health and safety are included. These have been written by Dr. A. H. Sully, the director of the British Steel Castings Research Association, who has diligently culled from the enormous mass of material available, interesting cases where the industrial research associations have greatly helped the community in an amazing variety of ways. Outstanding amongst these are health and comfort. Dr. Sully tells how Mae West when appearing in a show in Manchester had her clothing flameproofed by the British Cotton Industry Research Association. Dust suppression and clean air are subjects upon which the research associations have spent, with no little success, money, time and energy for the public good. Dr. Sully concludes: "In the absence of these associations such contributions would not have been made, or could only have been made by organizations financed entirely by public funds." Another article of general interest is on "Food Research in the United Kingdom." The reports on the three foundry research associations are condensed accounts of what has already been presented to members.

Whiting Founder, Winter-Spring, 1960. Published by Whiting Corporation, Harvey, Illinois, USA.

This issue is given over to a description of the cupola installation at the Acme Steel Company of Chicago. At the present time, due to trade recession, this melting plant is restricted to about 1,600 tons per day, or about 33 tons per hr. per cupola, but regular melting campaigns of up to 70 days are obtained and a record was of the order of 130 days. The charge consists of 10 per cent. broken ingot moulds and the remainder of baled light scrap. As far as is known, these cupolas (put into operation in July, 1959) appear to be the largest hot-blast units in operation in any steelworks. The plant at Acme is new in another respect as it is believed to be the first to combine two relatively new means of processing metal—large hot-blast cupolas and basic, top-blown oxygen steelmaking—into a single installation. The first such plant to be installed in the US, its basis is a pair of Whiting hot-blast cupolas, with inside diameters of 156 in. at the baseplate and 114 in. at the hearth, and are as tall as an eight-storey building. Plate 1½-in. thick was used for the body and stack shells and 2-in. plate for the bases. The cupolas accommodate a charge of stock 40-ft. high compared with a 25-ft. column of raw materials in ordinary cupolas. Both units are externally water-cooled in the melting zone and stack and are equipped with copper, water-cooled blast-furnace-type tuyeres, and are fitted with a Whiting-Thermo recuperative hot-blast system delivering air at 650 deg. C. at rates up to 40,000 cu. ft. per min. A split wind valving system makes it possible to operate both cupolas simultaneously.

Charge components vary with the amount of metal being produced. For example, when melting at capacity (50 tons per hr.), it is reported that the charge consists of 48 per cent. pig-iron and scrap, 52 per cent. steel scrap, 20 per cent. foundry coke, 6 to 7½ per cent. limestone and 1½ per cent. fluorspar. The cupolas are tapped directly into two 200-ton hot-metal mixers, one mixer serving each unit. These mixers are gas fired and equipped with steel-mill drives and controls. Metal from the mixers is delivered to the converters by means of 60-ton transfer ladles, with top diameters of 111 in., bottom diameters of 95 in., and are over 98-in. deep. Three of these ladles are in service at the plant.

The ladles charge the converters with about 80 per cent. of hot metal, scrap being then introduced to cool the charge and various additives utilized to produce any desired grade and type of carbon and low-alloy steel. Carbon is burned out at about 1,650 deg. C. by means of an oxygen lance positioned in the converter somewhat above the charge. It takes 30 min. for the converter blow and 60 min. for the entire operating cycle which produces some 60 net tons of steel. The converter lining lasts about 160 blows.

In time, Acme hopes to improve the plant's operating efficiency so much that the production rate can be boosted from the current 60 tons per hr. to 70 tons. At that rate, the company could get as many as 24 different batches of steel in 24 hours. Current facilities at Acme enable the company to produce 37,600 tons of ingots per month (450,000 tons a year) and by adding another cupola and auxiliary equipment, it could increase this total to 675,000 tons a year—estimated to be ample to supply the company's expansion needs for several years.

Control for Industry. Issued by Lancashire Dynamo Electronic Products, Limited, Rugeley, Staffs.

This brochure enters into the highest class of trade publication. It is beautifully illustrated in colour and the understanding of this highly complicated subject is facilitated by the use of clear diagrams and essentially readable English. The significance of automatic control of industry is lucidly explained. The brochure carries a section which outlines the aims of the company providing the background to its rapid development. In another section is reviewed a wide range of standard and other instruments now being manufactured by the company which indicate the potential of control equipment throughout industry.

Directory of Members, with Index of Products. Published by the Aluminium Development Association, 33, Grosvenor Street, London, W.1.

As a specialized directory covering the firms and products of the aluminium industry, this publication is particularly useful to buyers. About 150 products are listed and, of these, eight come from the foundry. Die-castings now come under three headings—gravity, low-pressure and pressure—whilst other headings covering castings are listed under machined, plaster-moulded, precision, sand and shell-moulded. The Light Metal Founders' Association is shown to have 32 members which include most of the larger firms, but also a few not entering into that category.

Export Assistance Register. Issued by the Institute of Directors, 10, Belgrave Square, London, S.W.1.

One of the most difficult problems in exporting is the selection of suitable agents or representatives. The question has been studied by some of the foundry industry's associations and one of the solutions suggested is exactly that which is set out in this publication. Briefly the system is that a number of individuals who are members of the Institute have offered their

Publications Received

services in an advisory capacity to firms (but obviously not to competitors) and a list of these persons and their firms and lines of business is quoted in the Register. For advice on exporting foundry equipment, two firms are named, both having very extensive foreign connections, and selling consumable goods. The reviewer confirms that these two firms do indeed represent a good source of information for matters concerning exports. The system divulged in this publication makes the requesting and giving of advice a personal matter between two directors acting, initially, as individuals. It is a commonsense arrangement which should be productive of much good.

Stöberiet (Foundry), vol. 38, No. 7, July, 1961. Monthly magazine serving the Danish foundry industry; published from 8 Sonderskovvey, Skovlunde, Denmark; yearly subscription Kr. 18.00; single copy, Kr. 1.75 (about 19s. and 1s. 11d. respectively).

The main article in this issue is devoted to the Virvelvind system of pneumatic sand-handling. Apparently it is of American origin and there are reported to be 130 installations in that country and 30 in Europe. The European licensees for this plant are Westin & Buckland of Stockholm and a full technical description is given. The magazine is the official organ of various Danish foundry associations.

Your Passport to Advancement in the Modern Foundry Industry, a leaflet issued by the Walsall Foundry Trade Joint Recruitment and Training Committee.

This leaflet was probably produced in connection with the recently-held Commonwealth Technical Training Week, and is a well-balanced publication except for one paragraph. This reads that apprentices may be sent one day a week to a technical college without loss of earnings, fees may be paid, books provided free and prizes offered. It is suggested that the "mays" should be eliminated, as these create doubt in the young men's minds.

Constituent Elements in Steel and Cast Iron. Published by the London & Scandinavian Metallurgical Company, Limited, 39, Wimbledon Hill Road, London, S.W.19; price 10s. 6d.

In this 84-page book, the influence of 29 elements, ranging from aluminium to zirconium, is given for both steel and cast iron. It is an excellent work of reference, and even the recorded fact that "silenium is not used in cast iron" is useful for it indicates that experimental work with this element has not so far proved worthwhile.

Gamma Radiography. From Pantraton, Limited, 5a, Princes Street, Hanover Square, London, W.1, has been received a quantity of business publications, including reprints from the technical Press covering various aspects of gamma radiography. One of them lists a number of users of the firm's equipment, in which appear the names of six well-known founders.

Nickel in S.S. Canberra. Published by the International Nickel Company (Mond), Limited, Thames House, Millbank, London, S.W.1.

This well-illustrated brochure opens with a description of some of the newer features of the S.S. Canberra, and then details all the parts, plant and equipment, which have nickel-alloys in their make-up.

Catalogues

Cast-to-form Tools. In publication No. T.3, John Harper & Company, Limited, Albion Works, Willenhall, Staffs, illustrate and describe a number of interesting cast-to-form tools they have supplied to various industries. Many of the examples shown disclose how industries normally considered to be competitive with branches of the foundry industry are, in reality, quite good customers. Especially is this true of plastics and sheet-metal for stoves. The publication is very informative and outlines a number of applications, the range of cast irons available, and the possibilities of improvements by heat-treatment. There are also notes on tool design and their life and the accuracy and finish of these tools. It is a very interesting publication and well illustrates how a modern foundry caters for specialized demands.

S.-g. Iron. The company has also published catalogue No. S.G.2 in which they well cover, from a business literature aspect, the potentialities of spheroidal-graphite iron. The various mechanical and electrical properties are detailed and some practical examples are given and illustrated of interesting industrial applications. A useful paragraph on design data is included, together with some notes as to just where the material finds its uses in the engineering world.

Air-line Equipment and Core Vents. In the second edition of this 1960-61 catalogue, Air Automation—a subsidiary of Temple Instruments, Limited, 26, Sharrocks Street, Wolverhampton—describe and illustrate a wide range of air cylinders, valves, air vices and similar equipment. Of major interest to readers is the last section of this loose-leaf publication, which covers precision corebox vents shown as the slotted and perforated copper-clad nickel type. The sizes available, which are extensive, are listed to cover both slotted brass and steel vents and the "Perflec" mesh types.

Factory Planning and Installation. In publication FP1-4-1, Thos. W. Ward, Limited, Albion Works, Sheffield, have certainly impressed the reviewer of their ability to shift plant from one or more works to one large new shop, with less fuss than is experienced when one removes from one house to another. In 24 well-illustrated pages they show by annotated pictures the various jobs they have undertaken. Not all by any means are just removals, but are new shops which the company apparently hands over to the occupiers ready to start manufacturing.

Heating Elements. In publication No. TD20/61, Morganite Electroheat, Limited, Point Pleasant, Wandsworth, London, S.W.18, a member of the Morgan Crucible group, describe the potentialities of "Crusilite" silicon-carbide elements for use in connection with small furnace work. A well-known application is the determination of carbon and sulphur in iron and steel. A number of other applications are covered in this 14-page well-illustrated brochure in which good use has been made of colour printing.

Pneumatic Temperature Controller. In list 103, Cambridge Instrument Company, Limited, 13, Grosvenor Place, London, S.W.1, illustrate and describe an instrument for indicating and controlling the working temperatures of vats and the like, and the temperatures of refrigerating, air-conditioning, and similar plant and processes operating between −20 and 340 deg. C.

Baker Perkins Machinery at work . . . . . *at Peter Brotherhood Ltd.*

Peter Brotherhood Ltd. use this 'Cadet' Rotary Table Shot Blast Machine for a wide range of application at a high production rate. Note especially the control desk which includes signal lights, 24 volt current socket for inspection and ammeters indicating the shot output of the impeller. The wiring circuit is arranged for automatic operation to cut out human errors.

Baker Perkins Ltd.

Engineers

BEDEWELL DIVISION · HEBBURN-ON-TYNE · Co DURHAM

PHONE: JARROW 897134

HISTORICAL NOTE

Peter Brotherhood Ltd. were established in London in 1868. In 1907, the works was transferred to Peterborough, Northants. In their Foundry, they produce a wide range of general engineering castings for air and gas compressors, steam turbines, steam engines, refrigeration plant, water turbines, chemical filtration plants, textile machinery, brewery machinery, and many other applications

CLASSIFIED ADVERTISEMENTS

PREPAID RATES: **Twenty words for 10/- (minimum charge) and 4d. per word thereafter. Box numbers 2/6 extra per insertion (including postage of replies). Situations wanted 2d. per word throughout.**

Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House, 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Monday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

CHIEF ENGINEER (41), A.M.I.Plant.E., A.M.I.B.F., desires change. Good experience mechanised foundries, ancillary plant, machine shops, buildings. Accustomed full responsibility. Installation, maintenance and development. Salary £2,000. Write Box CE858, FOUNDRY TRADE JOURNAL.

FOUNDRY DIRECTOR (37), A.I.M., M.I.B.F., with present company 12 years, desires change. Experience covers all aspects grey iron and non-ferrous castings production. Salary required £2,000. Box FD846, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

THIS advertisement for a FOUNDRY SUPERINTENDENT has been issued before but the vacancy has not been filled. Applications are again invited for this position. Applicants should have first class technical ability and a practical knowledge of all aspects of High Grade Iron Foundry production including mechanised semi-mechanised, jobbing work from small to 15 tons in Drysand, Loam and CO_2 Process. Knowledge of Nodular Iron production also necessary.

Initiative and executive ability absolutely essential. Superannuation scheme available and assistance will be given with housing. Excellent prospects for the right man but only a first class foundryman with good knowledge of shop management should apply to:—

GENERAL MANAGER,
THE BUTTERLEY CO. LTD.,
Engineering Works,
Butterley, Derbys.

FOUNDRY METHODS ENGINEER
REQUIRE DBY
THE NORTH BRITISH STEEL FOUNDRY LIMITED
Balbardie Steel Works, Bathgate, West Lothian, Scotland.

The Company operates a modern Steel Foundry producing castings up to 10 tons in weight. The position calls for a man with experience of foundry techniques. A salary commensurate with experience will be paid.

There is a Pension Scheme in operation.

Applications, in writing, should state age, education and experience, and be addressed to Production Controller.

SITUATIONS VACANT—*contd.*

DERBYSHIRE EDUCATION COMMITTEE
ILKESTON COLLEGE OF FURTHER EDUCATION

Applications are invited for the post of Assistant Lecturer (Grade B), in Patternmaking and Foundry subjects. Duties to commence 1st September, 1961, or as soon as possible thereafter.

Applicants should possess a Final City and Guilds Certificate in Patternmaking. Possession of a Final Certificate in Foundry work would be an advantage.

Salary Scale, £700 × £27 10s. to £1,150 per annum. Additions will be paid for approved qualifications and training and increments up to a maximum of 12 will be allowed within the scale for appropriate industrial experience.

Application forms and further particulars may be obtained from the undersigned to whom the completed forms should be returned as soon as possible.

R. F. COLLINS,
CLERK TO THE GOVERNORS.

ILKESTON COLLEGE OF FURTHER EDUCATION,
FIELD ROAD, ILKESTON, DERBYSHIRE.

NEW ZEALAND OPPORTUNITY FOR MOULDER (BRASS). A first-class, reliable jobbing moulder, married or single, is required for a small firm in Christchurch, New Zealand. Must qualify for emigration regulations. Excellent wages and conditions, and guaranteed accommodation on arrival. For further information write to: MR. B. J. FRASER, c/o THE NATIONAL BANK OF N.Z., LTD., 14, Charles II St., London, S.W.1

PATTERN MAKERS

Must have good general knowledge of small precision work. Good wages and conditions. Apply **PERSONNEL DEPARTMENT, E.M.I. LTD., BLYTH ROAD, HAYES, MIDDLESEX.**

FLOOR MOULDERS, two required, for aluminium castings up to 200 lb. and copper base alloys to 400 lb. Apply STARLING FOUNDRY LTD., 46, Pitlake, Croydon, Surrey. Croydon 2193.

MOULDER wanted for non-ferrous jobbing foundry, South East Kent. Regular work, good pay. Apply by letter: JUNCTION FOUNDRY, Myrtle Road, Folkestone.

SITUATIONS VACANT—*contd.*

PLANT ENGINEER

EXCELLENT opportunity for Plant Engineer with wide experience of maintenance of mechanised foundry plant. Minimum qualification H.N.C. Good starting salary and excellent prospects. Assistance with housing if necessary. Please send brief details in confidence to Box PE881, FOUNDRY TRADE JOURNAL.

FOREMAN required for busy non-ferrous foundry in Croydon area. Write stating age and give full details of experience and salary required. No housing accommodation available. Box FR876, FOUNDRY TRADE JOURNAL.

APPLICATIONS invited for position of MANAGER, embracing Ferrous and Non-ferrous Foundries, combined melt 100 tons, situated in Lancashire. In addition to a wide foundry knowledge, including up-to-date mechanisation, applicant's ability should cover utilisation and control of foundry personnel, time assessment, and control of metals to conform to all B.S.S. Specifications. This is a Top Line Job and calls for a disciplinarian of the highest calibre, capable of blending existing units into an efficient organisation. Write with confidence, submitting details of age, experience, qualifications, and salary required, to Box AI877, FOUNDRY TRADE JOURNAL.

THE following personnel are required by a large British Group of Companies for large projects overseas, including Eastern Europe.

SENIOR SUPERVISORY ENGINEER, for erection and installation of foundry plant.

METALLURGIST, for advising and training personnel in coltrol techniques of Grey Iron Foundries.

LABORATORY TECHNICIAN, for training laboratory personnel in modern laboratory practice.

Suitably experienced men are invited to apply to:—

CONSOLIDATED FOUNDRY PLANT LIMITED,
117, Great Portland Street,
London, W.1.

Closing date for applications is August 11th, 1961.

LIGHT ALLOY FOUNDRY SENIOR TECHNICIAN required for an aluminium fabrication company in Calcutta. Preferred age about 35. Experience in sand, gravity die and pressure die casting desired; toolroom or die design knowledge an advantage. Tours of duty two years with good leave allowance between tours. Salary according to age and experience, but not less than £150 per month after tax. Applications in writing, with full particulars, to Box FTJ600 LPE, 60/62, St. Martin's Lane, London, W.C.2.

BUSINESS WANTED

REQUIRED to purchase. Small-med. Non-ferrous Foundry in or around London area. Box RT849, FOUNDRY TRADE JOURNAL.

MACHINERY WANTED

WANTED. Box type dust extractors to handle 1,000-1,500 and 4,500 c.f.m. Box WB878, FOUNDRY TRADE JOURNAL.

WANTED. Two Cupola Furnaces, approximately 5 ft. or 6 ft. outside dia. Preferably with spark arrestor, fan, motors and starters. Please state full particulars MESSRS. J. C. HULSE & Co. LTD., Hinkshay Road, Dawley, Shropshire.

Cleveland Plant and Machinery Co., Ltd.,

want your

Surplus Foundry Plant and Forging Equipment

Best prices given

Wharncliffe House
44 Bank Street
Sheffield, 1
Tel. No. 29051

MACHINERY FOR SALE

MORGAN ROTARY CRUCIBLE FURNACE, 6 cwt. capacity. Overhauled since last used. Also three new Morgan Q84 Crucibles to suit. Offers to PLATT METALS LTD., Enfield. Howard 3351, Ext. 37.

850 KVA. E.C.C. Outdoor Transformer. Input 11,000 volts, 3 phase, 50 cycles. Output 433/240 volts. WHITEFIELD MACHINERY & PLANT, LIMITED, 48, Chatham Street, Edgeley, Stockport.

SHOTBLAST MACHINES

All sizes Rooms or Cabinets. Ex stock or prompt delivery. Low prices.

Try us for

Spare parts & tungsten carbide nozzles.

Fully illustrated Catalogue free on request

Actual Manufacturers

ELECTROGENERATORS LTD.
AUSTRALIA ROAD, SLOUGH
Telephone: SLOUGH 22877
49 years of satisfactory service

MACHINERY FOR SALE—*contd.*

SAND SLINGERS by FOUNDRY PLANT & MACHINERY, Glasgow:
20 in. head, 10 ft. radius.
20 in. head, 12 ft. radius.
10 in. head, 3 ft. radius.

COREMAKING MACHINES:
Fordath Multiplunger, 3/50/400 V.
Fordath "Junior," 3/50/400 V.

SAND MIXERS:
FORDATH No. 1, 12 in. dia. pan.
FORDATH Ca., 1 ft. 6 in. dia. pan.

SAND MILLS:
PNEULEC 6 ft. diam. with Skip Hoist.
August-Simpson 6 ft. dia. with Skip Hoist.
Mullrex No. 2, 4 ft. 6 in. dia. pan.
Also 3 ft. 6 in., 4 ft., and 5 ft. diam.

For ALL Types of Foundry Plant and Machinery try:

S. C. BILSBY & CO.,
Hainge Road, Tividale, Staffs.
Tipton 2448
(established over 40 years)

SAND MIXERS and DISINTEGRATORS for Foundry and Quarry: capacities from 10 cwts. to 10 tons per hr.—W. & A. E. BREALEY (MACHINERY), LTD., Misterton, nr. Doncaster. Tel.: Misterton 202

Titan Coreblower, 75 lbs. capacity. Almost new.
Saw Sharpening machine. Cheap.
Abrasive Development Aqua-Spray, wet type Blast Machine. Almost new.
Large and Standard size Adaptable Moulding machines.
Modern Rumbling Barrel, 6ft. by 3ft.
Large stock of geared Ladles up to 8 tons capacity. List on request.
Few Roper Ladles and Roper Ladle Hoists, 3- and 5-cwt. capacity.
New Bale-out and Lift-out Furnaces. Please send for illustrated leaflets.
Monometer 800 lb. Aluminium capacity Rotary Furnace.
Large stock of small moulding Boxes at low prices to clear. List on request.
Several Cummings coke-fired Furnaces.
Cummings oil Sand Mixer.
Two Pneulec Jolt Squeeze Moulding machines.
Morgan tilting furnace, type C.A. 400 lbs. capacity, complete with burner and fan.
200 assorted Keith Blackman fans.
Lathe, 5in. all geared head. £50.

ELECTROGENERATORS LTD.
Australia Road, Slough, Bucks.
Tel.: Slough 22877 & 22094

Roper
LADLES
STOCK UP TO 5TON CAP.
E. A. ROPER & CO. LTD.
KEIGHLEY • Phone: 4215-6

MACHINERY FOR SALE—*contd.*

ELECTRIC HOIST BLOCKS from ½ ton to 5 ton capacity in stock at attractive prices. Box EH855, FOUNDRY TRADE JOURNAL.

FOR SALE. Tilghman WST.3D. Dual 36 in. dia. swing table "Wheelabrator" airless abrasive cleaning plant, complete with dust arrester. Little used. Purchased 1956. Reply Box FS862, FOUNDRY TRADE JOURNAL.

All plant in Scottish Mechanised Foundry for Sale

12 TPH Sand Plant with No. 3 August Mill. Conveyors over 4 J/S M/cs and F. P. & M. Slinger. Large capacity mould conveyors. All commissioned 1958. Cupolas 3 and 4 TPH skip charged. Jackman S'blast. 12ft. by 10ft. 23,000 cfm wet dust collectors No. H12 Hansberg.

J. ARNOTT & CO.,
15, Carlyle Avenue, Glasgow, S.W.2

TWW

9 FT. Radius Sand Slinger by Foundry Plant & Machinery, three motors, 400/3/50.
Linslade No. 1 Sand Slinger, 10 ft. radius, two motors, 400/3/50.
Collin 10 tons Geared Foundry Crane Ladle.
New Geared Crane Ladles, 10 cwt. to 5 ton cap.

B.M.M. MOULDING MACHINES.
HPL1 Jolt Squeeze Pattern Draw, 26 in. × 18 in.
HPL3 Jolt Squeeze Pattern Draw, 36 in. × 25 in.
RD5 Jolt Squeeze Turnover, 48 in. × 30 in.
BT5 Jolt Squeeze Turnover, 36 in. × 28 in.

COLEMAN WALLWORK JOLT SQUEEZE STRAIGHT DRAW MOULDING MACHINES.
WT563C., table 35 in. × 24 in.
WT563, table 22½ in. × 19 in.

Self Contained Coke Fired Oven, two compartments each 18½ in. wide × 83 in. high × 36 in. 6/f.
Vibratory Sand Riddles, 22 in. dia., 400/3/50, with tripod.
August No. 3 Motor driven Sand Mill, 8 ft. dia. pan, 12/15 tons hour cap., 400/3/50.
Also AIR COMPRESSORS, all sizes, new and secondhand; Cupola Blowing and Extraction Fans; Shot Blast Equipment, etc., etc.
Our stocks are constantly changing. Please send us your enquiries.

THOS. W. WARD LTD.
BRETTENHAM HOUSE, STRAND, LONDON, W.C.2.
'Phone TEMple Bar 1515 (12 lines)

Remember • Wards might have it!

MACHINERY FOR SALE—*contd.*

LUKE & SPENCER Swing Frame Grinder. Bigwood 30 in. D.E. Fettling Grinder. Noble & Lund 30 in. Horizontal Band Saw. Jackman 4 ft. Shot Blast Cabinet with built-in Dust Arrestor and Compressor. Three only 500 lb. Al. oil fired Tilting Furnaces by Morgan. Box LS854, FOUNDRY TRADE JOURNAL.

GAMMA RADIOGRAPHY

EQUIPMENT for good shielding and operational safety is made by Pantatron Limited, 5A Princes Street, London, W.1.

FOR SALE. Two pairs new snap flask boxes, 20 in. square × 4 in. tops and 4 in. bottoms together with 25 jackets. Phone or write: BRASSFOUNDERS (BFD) LTD., Cragg Works, Gt. Horton Road, Bradford 7. Tel. Bradford 71649.

TWO 6-ft. dia. Cupolas complete with fan and motor. 400. 3-phase 50 supply, capacity of 10 tons per hour, together with additional fan and motor to produce melt of 5-6 tons per hour when lined down. Box TS879, FOUNDRY TRADE JOURNAL.

MATERIALS WANTED

WANTED

SCRAP ELECTRODE CARBONS
GRAPHITE-OFFCUTS

details of tonnages and samples to

FINE GRINDING LTD
Blackhole Mine, Eyam, Derbys.
Phone: Eyam 227

WANTED URGENTLY

Discarded Sacks,
Slag Bags,
Old Sacking.

For good prices and prompt settlement sell to actual users.

JOHN COTTON
(JUTE) LTD.
NUNBROOK MILLS
MIRFIELD · YORKSHIRE
Tel: Mirfield 3306-7

MATERIALS FOR SALE

NUCLEAR GRAPHITE weekly supplies available. Box NG872, FOUNDRY TRADE JOURNAL.

FIREWOOD for Cupolas, Sleepers and Sleeper Wood in wagon loads.—TRACK SUPPLIES & SERVICES LTD., Haversham Bank Sidings, Wolverton, Bucks.

PROCESSED FOUNDRY MANURE. Higher permeability, greater strength, lower cost, cleaner castings, pest-free and odourless. Now used by more than 100 leading foundries and engineering works. 24-hour delivery service. 150 miles radius of Birmingham. GINSTER BROS., Walsall. Tel. 27367.

pulverite

COAL DUST

lowest in ash

The STANDARD PULVERISED FUEL Co. Ltd
Head Office
47 VICTORIA STREET, WESTMINSTER
LONDON, S.W.1 TEL: ABBey 6255/6

CAPACITY AVAILABLE

WOBURN ENGINEERING LIMITED, Woburn, near Bletchley, Bucks, offer the facilities of their Machine Shop, three miles off the M.1. Telephone: Woburn 628/9.

HEAT TREATMENT of Iron and Steel. Annealing, Normalising, Stress Relieving and Shotblasting. Prompt delivery by our own transport. THE RUSTLESS IRON CO., LTD., Trico Works, Keighley. Tel. Keighley 3737.

CASTINGS.—We can save your porous castings, ferrous or non-ferrous, by an approved impregnation process; sample castings treated. A.I.D. approved.—RECUPERO, LTD., 66, South Harrow Viaduct, Harrow, Middlesex. 'Phone: Byron 1178.

FOR successful castings from your plant. Pressurecast matchplates, precision wood or metal pattern equipment can be purchased quickly, competitively, from BOOTH BROS. ENGINEERING, Baggrave Street, Leicester. Tel. 67030.

VITREOUS ENAMELLING.—Capacity available for enamelling castings in all finishes (plain, mottle, marble, lustre etc.). Prompt delivery by our own transport. THE RUSTLESS IRON CO., LTD., Trico Works, Keighley, Yorks. Tel.: Keighley 3737

CAPACITY AVAILABLE—*contd.*

CAPACITY available for Iron and Steel Castings, Sand and Shell Moulding, pattern making capacity. Enquiries invited: KNOTT CASTINGS, LTD., Station Road, West Horndon, Essex.

CAPACITY offered for all types of Non-ferrous Castings. Up to 6 cwt. L. C. JAY & SON LTD., 21, Oak Street, Norwich. Tel. 28798.

Phone: Hockley (Essex) 337

HOCKLEY FOUNDRY CO. LTD.
HOCKLEY, ESSEX

for first class
CYLINDER-IRON CASTINGS
BY SHELL & ALL MODERN PROCESSES

Quick & reliable delivery

London Address: 5 Osbert Street, Westminster, S.W.1.

Telephone : Victoria 7486

MISCELLANEOUS

FOR SALE
LOCKERS AND WASHROOM EQUIPMENT

308 GALVANISED STEEL LOCKERS (6 double blocks of 44—2 ft. 6 in. deep, and two single blocks of 22—1 ft. 8½ in. deep). Height 9 ft. 4 in., length 11 ft. plus 7 in. External Heat Duct. Shelf, Soap Dish, Coat Holder, Hanging Hook, Silver Grey Finish. Excellent condition.

23 LAVATORY BASINS (Range of 7, Island Block 16) White, complete with taps and fittings.

20 SHOWERS (Run of 14, Island Block of 6).

Anti Scald C.P. Mixing Valves, Typhoon O/Head Shower Attachments. All Inlets/Outlets Piping and Supports.

11 Extractor Fans. Wall mounted.

Nine FOOT BATHS (Block of 4 and 5) White.

DIVIDED FLOW MIXERS. C/W wastes and service pipes.

SCOTCH PARK TRADING ESTATE, Forge Lane, Canal Road, Armley, Leeds 12.

Appointment to view. Tel. Leeds 43471 or write MOAT (BUILDERS' MERCHANTS) LTD., 9, Newton Road, Leeds 7.

PATTERNMAKERS

PATTERNS for all branches of Engineering for Hand and Machine Moulding.—FURNISTON & LAWLOR, LTD., Letchworth.

HENRY CLUETT & CO., LTD.—Patterns of all types in Wood, Metal and Epoxy Resin. Quotations by return. Quick delivery. Furlong Road, Tunstall, Stoke-on-Trent. Tel. 87822.

PATTERNMAKERS—*contd.*

THE
KERR PATTERN CO. LTD
ALL TYPES OF PATTERNS
ROSEMARY LANE, **LINCOLN**
TELEPHONE : LINCOLN **241**

PATTERNMAKERS—*contd.*

PATTERNS WOOD AND METAL
CAPACITY FOR WADKIN PATTERN MILLER
GOOD DELIVERIES
ELLIOTT MUSGRAVE, LTD.,
LONGSIDE LANE, BRADFORD 7
Telephone : BRADFORD 24464

PATTERNMAKERS—*contd.*

PATTERNMAKERS
(Engineering) CO. LTD.
Shrewsbury Road, London, N.W.10
PATTERNS
CASTINGS
Phone : ELGAR 8031/2

HAND OR PLATE PATTERNS IN WOOD & METAL
●
ACCURATE MODELS FOR DUPLICATING OR KELLER MACHINE PROCESSES

RULE AND MOFFAT
PATTERNMAKERS
WESTFIELD AVENUE, RUTHERGLEN, GLASGOW
Telephone : RUTHERGLEN 3039

ESTIMATES PROMPTLY ATTENDED.
KEEN PRICES AND GOOD WORKMANSHIP GUARANTEED
●
CASTINGS SUPPLIED IN IRON, STEEL AND ALUMINIUM

SUBSCRIPTION ORDER FORM.

To the PUBLISHER

FOUNDRY TRADE JOURNAL

With which is incorporated "THE IRON & STEEL TRADES JOURNAL"

TELEPHONE : TRAFALGAR 6171 — **JOHN ADAM HOUSE 17/19 JOHN ADAM STREET ADELPHI · LONDON · W.C.2** — TELEGRAMS : "ZACATECAS. RAND. LONDON."

Please send the **FOUNDRY TRADE JOURNAL** to the address given below until countermanded, for which **£2.12.0.** (Home) **£3. 0.0.** (Abroad) is enclosed in payment of One Year's Subscription.

Name.....

Address.....

Date.....

Cheques and Post Office Orders to be made payable to: —INDUSTRIAL NEWSPAPERS (FUEL & METALLURGICAL), LTD.

B. LEVY & COMPANY (PATTERNS) LIMITED

FULLY-MACHINED METAL PATTERNS, coreboxes, core-driers and setting-jigs for SHELL-MOULDING and machines.
WOODEN PATTERN EQUIPMENT of all sizes and types for loose-pattern and plate moulding.
EPOXY RESIN MULTIPLES and replacement equipment. (Plastic Patterns)
KEEN QUOTATIONS RELIABLE DELIVERIES
B. LEVY & CO. (PATTERNS) LTD., 1-5 OSBERT STREET, LONDON, S.W.1
TELEPHONE : VICTORIA 1073 or 7486

STOKE-ON-TRENT 22627
COOKE BAILEY Ltd.
MORLEY ST., HANLEY STOKE-ON-TRENT
WOOD & METAL PATTERNS

H. J. DOWLER (ENGINEERS' PATTERN MAKERS) LTD.
WOOD AND METAL PATTERNS. HYDRAULIC DUPLICATING.
PATTERNS FOR SHELL MOULDING. EPOXY RESIN PATTERNS.
GRAVITY DIES.
147 GRANVILLE STREET, BIRMINGHAM 1
MID 0649

G. PERRY & SONS LTD. HALL LANE LEICESTER
WOOD & METAL PATTERNS
PRESSURE CAST PLATES
OVER 150 SKILLED CRAFTSMEN AT YOUR SERVICE
TELEPHONE LEICESTER 32261

TWIN 4 H.P. MOTOR TWO SPEED GRINDING MACHINE

Designed to enable the correct periphery cutting speed to be maintained, and allow each wheel to operate independently, thus one wheel only need be used or alternatively both wheels can be used at different speeds simultaneously.

SAFETY DEVICE TO PREVENT HIGH SPEED BEING ENGAGED WITH A NEW WHEEL

Size of Grinding Wheels	—	20" × 3" × 7"
Speed of Motors	—	1400 r.p.m.
Speed of Spindles	—	1100 & 1250 r.p.m.
Distance between wheel centres	—	5' 0".
H.P. of Motors (2)	—	4.

20" MODEL

illustrated fitted with B.C.I.R.A. Hoods.

Also manufacturers of 10" 12" 14" and 16" Grinders and 9" Power Hacksawing Machine.

MADE IN ENGLAND

CABLES NILMACH · LONDON

NORTON INDUSTRIES LTD.

SALES DIVISION · STAFFORD HOUSE · NORFOLK ST · STRAND · LONDON WC2

Telephone TEMple Bar 0681

GRAMS NILMACH · ESTRAND LONDON

Reliable

FOUNDRY REQUISITES

by

WILLIAM FOXALL LIMITED BALDS LANE · WOLLESCOTE · STOURBRIDGE

MAKERS OF FOUNDRY REQUISITES SINCE 1886

Tel: LYE 2727 & 2522

The EXPRESS COREMAKER

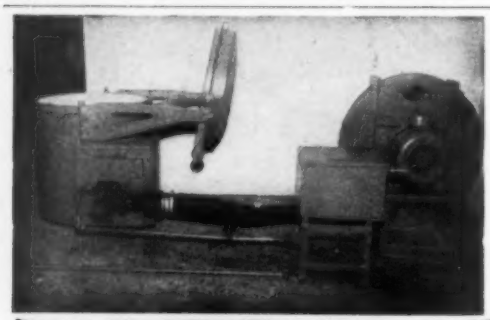
Adjustable air control
Simple and quick height adjustment
Extreme accessibility
Fitted with silencer
Quickest possible action

For anyone requiring a quick acting and reliable core blower at a very reasonable price, then this is the machine.

Sand capacity of blow head—11 lbs. Maximum capacity of core which can be blown at one charge—9 lbs. Maximum corebox dimensions 15 ins. high. 9 ins. between clamps. Air pressure regd. 80 lbs. Air supply 1½ ins. gas fitting. Overall height 54 ins. Weight 544 lbs.

STERLING FOUNDRY SPECIALTIES LTD., BEDFORD

Cogent



Oil-Fired **CRUCIBLE FURNACE**

200 lb. Copper Melting Capacity

Please send for details to:

NORRIS EQUIPMENT & CONSTRUCTION LIMITED

58 QUEENS ROAD · BRISTOL 8

TELEPHONE BRISTOL 36817

Metal treatment

and Drop Forging

A monthly journal devoted to the properties, uses, testing and treatment of special steels and light alloys, and to forging technique in all its branches, 2/6d. per copy, 30/- yearly.

Write for a specimen copy to:

Metal Treatment and Drop Forging

John Adam House, 17/19, John Adam St., London, W.C.2

COKE

FOR ALL PURPOSES

CAWOOD WHARTON & CO. LTD.

"SOUTHLANDS" HARROGATE.
Tel. Harrogate 6868

ST. MARTIN'S HOUSE, LONDON, S.E.16
Tel. Woolwich 5232

You never see a prima donna pair of **Bennett's** gloves

A wide range of quality industrial Gloves, Mitts, Aprons, and Clothing in leather, rubber, asbestos, plastic and various fabric materials are made and stocked for all trades and processes. Technical Representatives are available for consultation in all parts of the British Isles at short notice.

—but **opera**tives sing their praises!

BENNETT'S

INDUSTRIAL GLOVES

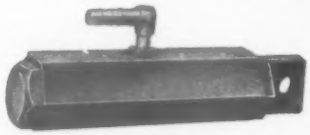
H. G. BENNETT & CO. (Gloves) LTD.
Industrial Glove Specialists
LIVERPOOL 23 · GREat Crosby 3996/7

cvs-17(A)

THE "EXPRESS"

PNEUMATIC VIBRATOR

Available in two sizes:
1" bore 45/-
1½" .. 70/-



"EXPRESS" Vibrators eliminate battered plates—save time and money.

THE "EXPRESS"

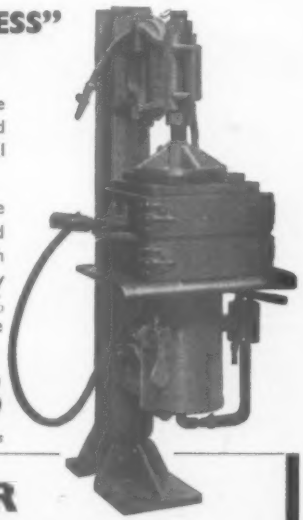
SQUEEZER

Unrivalled for the cheap and rapid production of small castings.

Founders using the "Express" and squeezing both parts simultaneously produce 200-300% faster than on the bench or stump.

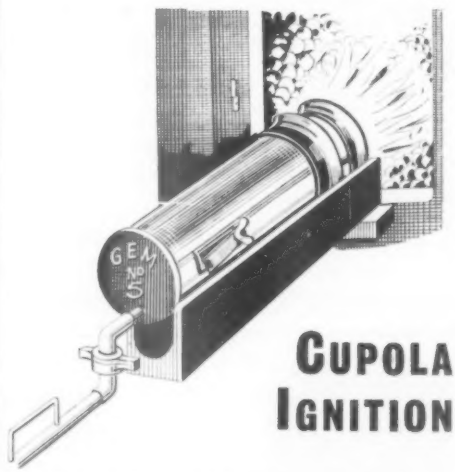
PRICE **£85**

Complete with accessories



FISHER FOUNDRIES LTD.

ALBION ROAD, GREET, BIRMINGHAM
Telephone: VICtoria 0197



CUPOLA IGNITION

CHEAP · QUICK · CLEAN

WRITE FOR DETAILS TO:—

WOODWARD BROS. & COPELIN, LTD

Lime Tree Road, Matlock, Derbyshire
Tel: Matlock 3055

JAS. EVANS & CO. LTD.

EVERYTHING FOR THE FOUNDRY

CUPOLAS	MOULDING BOXES
WET & DRY SPARK ARRESTORS	STUDS AND CHAPLETS
LADLES	BRUSHES
SAND MIXING PLANT	RIDDLES AND SIEVES
SAND DRIERS	SPRIGS AND NAILS
BARROWS	PLUMBAGO

BRITANNIA WORKS, CROSS ST., SALFORD, 3, Lancs

Behind all ESCO Products...

Esco Products include:—
Tandem White Metals and Bearings complete or relined.
Gun Metal & Phosphor Bronze Chill Cast Rods and Ingots.
T.C.C Continuous Cast Rods.
Rotocast Bronze Bushes and Blanks.

* *Send for booklet 'the lining of bearings', and technical Data sheets*

THE **EYRE** SMELTING COMPANY LTD

TANDEM WORKS, MERTON ABBEY, S.W.19 · Telephone MITCHAM 2031

SIEBER FOR...

A '7 STAR' LOGICAL CLOAKROOM

- SAVES SPACE
- SAVES COST
- PRESERVES GARMENTS
- ENSURES HYGIENE
- AIRS AND DRIES WET CLOTHING
- REDUCES ABSENTEEISM
- MEETS NEW FACTORY ACT

Installed in Factories, Stores, Offices, Swimming Baths, etc., throughout the country.

JAMES SIEBER
Equipment Co. Ltd.
Africa House.
Kingsway, London, W.C.2. *Tel Holborn 4531/5121*

Wm. REID & Co.

PATTERNMAKERS

full facilities available for precision patternmaking for hand and machine moulding.
Keen Prices—Prompt Delivery.

Phone SOUth 0075 or write :—

Wm. REID & Co., Cardwell Street, Glasgow, C.5

DIAMOND SUPER-RAPID CRUCIBLES

Special glazing

THE WILSON CRUCIBLE CO. LTD.
16 PHILPOT LANE, LONDON E.C.3
Tel. MAN 8138/9

Telegraphic Address:
CRUCIGRAPH, LONDON

AAF ROTOCLONE* DUST COLLECTORS FOR BETTER DUST CONTROL

AIR CONTROL
INSTALLATIONS LIMITED
RUISLIP · MIDDLESEX · VIKing 1222

* Regd. Trade Mark. Made in Great Britain by Air Control Installations under licence from American Air Filter Co., Inc.

ALBERT SMITH & CO.
60, St. Enoch Square
Phone: Central 5909 GLASGOW, C.1 'Grams Thrower, Glasgow

FOR COMPLETE
FOUNDRY SERVICE
PLANT TOOLS
FURNISHINGS

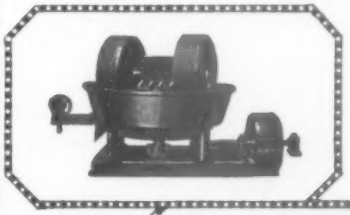
EVERYTHING FOR THE FOUNDRY

THE BRITISH SHOTBLAST & ENGINEERING CO. LTD.
STRETFORD LANCS. ENG.
PHONE: LONGFORD 1187

THE VERY LATEST IN SHOTBLAST EQUIPMENT & DUST ARRESTERS
NEW TYPE SHOTBLAST HELMETS IN MOULDED RUBBER, PRACTICALLY INDESTRUCTIBLE
PATENT NO. 861167

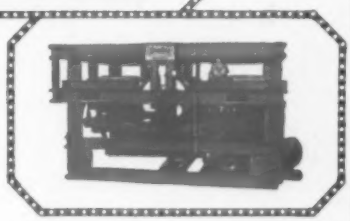
WRITE NOW FOR PARTICULARS AND PRICES.

TRADE Smedley MARK
SAND TREATING MILLS



BATCH MILL
1 to 20 cwts. per charge
CONTINUOUS MILL
5 to 40 tons per hour

Revolving or Stationary PANS
Over or under-driven



Smedley Brothers, Ltd.
Belper.
Derbyshire.

Telephone:
Belper 12

BLACK SEAM AND HISEGAR REFRACTORIES

Linings, Patchings, Cements, Ground Fireclay, Firebricks, Foundry Sands and Compo.

MIDLAND MONOLITHIC FURNACE LINING COMPANY LIMITED
GOOSE LANE, BARWELL, LEICESTER
Tel. Earl Shelton 2061/2 (2 lines)

BLACK SEAM
preheated downdraught
CRUCIBLE FURNACES
Coke, Oil or Gas Fired
Free demonstrations at your works

FOR GRAVITY DIES
R. E. Ormerod Ltd
EDNALL LANE, BROMSGROVE, Worcs.
Telephones 2987 & 3576

INDEX TO ADVERTISERS

	Page Nos.
A.E.I.-Birlec, Ltd.	—
A.E.I. Plastics (Aldridge) Ltd.	—
Acme Conveyors, Ltd.	—
Air Control Installations Ltd.	49
Albion Pulverising Co. Ltd.	—
Allan, John, & Co. (Glenpark), Ltd.	—
Alley Compressors, Ltd.	—
Amafond	—
Amber Oils, Ltd.	—
Anderson-Grice Co., Ltd.	—
Annealers, Ltd.	—
Armstrong Whitworth (M.I.), Ltd.	—
Ashworth Ross & Co., Ltd.	—
Aske, Wm., & Co., Ltd.	—
Associated Lead Mfts. Ltd.	—
Atlas Copco (G.B.), Ltd.	—
August's, Ltd.	38
Austin, E., & Sons, Ltd.	—
Badische Maschinenfabrik A.-G.	15
Bairds & Scottish Steel, Ltd.	—
Baker Perkins, Ltd.	39
Balbardie, Ltd.	—
Ballard, F. J., & Co., Ltd.	—
Ballinger, L. J. H., Ltd.	—
Beans Industries, Ltd.	—
Belliss & Morcom, Ltd.	—
Bennett, H. G., & Co. (Gloves), Ltd.	47
Berk, F. W., & Co., Ltd.	—
Bilston Stove & Steel Truck Co., Ltd.	—
Birkett, F. W., & Co., Ltd.	—
Birlec-Efco (Melting), Ltd.	52
Blackwell's Metallurgical Works, Ltd.	—
Boydell, E., & Co., Ltd.	30
Bradbury, John & Co. (Stockport), Ltd.	—
Bradley & Foster, Ltd.	—
British Acheson Electrode, Ltd.	—
British Aero Components, Ltd.	—
British Cast Iron Research Association	—
British Electrical Repairs, Ltd.	—
British Foundry Units, Ltd.	—
British Industrial Sand Ltd.	18
British Iron & Steel Federation	—
British Monorail, Ltd.	—
British Moulding Machine Co., Ltd.	34 & 35
British Resin Products Ltd.	—
British Ronceray, Ltd.	—
British Shotblast & Engineering Co., Ltd.	49
Broom & Wade, Ltd.	25
Buckland Sand & Silica Co., Ltd.	—
Burn, John, & Co. (B'ham), Ltd.	—
Burnand, W. E., & Son, Ltd.	24
Canning, W., & Co., Ltd.	—
Carborundum Co., Ltd.	—
Catalin, Ltd.	—
Cawood Wharton & Co. Ltd.	46
Chapman & Smith, Ltd.	—
Chemicals & Feeds, Ltd.	—
Chetham Timber Co. Ltd.	—
Ciba (A.R.L.), Ltd.	—
City Casting & Metal Co. Ltd.	—
Clayton Crane & Hoist Co.Ltd.	—
Cleanair, Ltd.	—
Cohen, Geo. Sons & Co., Ltd.	—
Coleman-Wallwork Co. Ltd.	—
Combustion Chemicals, Ltd.	—
Consolidated Pneumatic Tool Co., Ltd.	—
Constructional Engineering Co., Ltd., The	51
Controlled Heat & Air, Ltd.	26
Conveyor & Shotblast, Ltd.	—
Cooke, Bailey, Ltd.	44
Coreshooters Sales, Ltd.	—
Corrosion, Ltd.	—
Cox & Danks, Ltd.	14
Crockett Lowe, Ltd.	8
Crooks, L. E.	—
Cumming, Wm., & Co., Ltd.	24
Dallow, Lambert & Co. Ltd.	—
Dickson, Roy Wilson, Ltd.	—
Distillers Co., Ltd., The	—
Dowler, H. J., Engineers & Pattern Makers, Ltd.	44
Dowson & Mason, Ltd.	—
Dunford & Elliott (Sheffield), Ltd.	—
Durrans, James & Sons, Ltd.	12
Dustruction, Ltd.	—
Dustructor Co., Ltd.	—
Dyson, J. & J., Ltd.	36
Electrical Development Association	—
Electrogenerators, Ltd.	—
Elliott Bros. (London), Ltd.	—
Elliott, E., Ltd.	—
Engineering Services (Manchester) Ltd.	—
Ertel Ores, Ltd.	—
Escol Products, Ltd.	—
Evans, James, & Co., Ltd.	47
Evans, Roy, M.I.B.F.	—
Evans, Stanley N., Ltd.	—
Eyre Smelting Co., Ltd.	48
F. & M. Supplies, Ltd.	—
Felco Hoists, Ltd.	—
Fenton Byrn & Co., Ltd.	—
Filter-Heat, Ltd.	9
Fischer, George, Ltd.	—
Fisher-Foundries, Ltd.	47
Fletcher Miller, Ltd.	—
Flextol Engineering Co., Ltd.	—
Fordath Engineering Co., Ltd.	2
Foseco International, Ltd.	—
Foseco, Ltd.	—
Foundry Equipment, Ltd.	32 & 33
Foundry Mechanisations (Baillol), Ltd.	—
Foundry & Metallurgical Equipment Co., Ltd.	—
Foundry Plant & Machinery, Ltd.	22
Foundry Suppliers, Ltd.	—
Foxall, William, Ltd.	45
Foxboro Yoxall, Ltd.	—
Frankiss, R. J.(Patterns) Ltd.	—
Franklin Furnace, Ltd.	26
Fuel & Metallurgical Processes, Ltd.	—
Fullers' Earth Union, Ltd., The	11
G.W.B. Furnaces, Ltd.	—
Gas Council	—
General Electric Co., Ltd.	—
General Refractories, Ltd.	—
Gliksten, J., & Son, Ltd.	—
Goodyear Tyre & Rubber Co., Ltd.	—
Graphite Products	—
Great Lakes Carbon International, Ltd.	—
Green, E., & Son, Ltd.	—
Green, Geo., & Co.	—
Gregory, J. G., & Sons, Ltd.	—
Griffiths, A. E. (Smethwick), Ltd.	—
Guest, Keen Iron & Steel Works	—
Guyson Industrial Equipment Ltd.	—
Harborough Construction Co., Ltd.	19
Hargraves Bros. (Manchester), Ltd.	—
Harris & Pearson, Ltd.	—
Harvey & Longstaffe, Ltd.	—
Harvey, J. J. & Pressurecast, Ltd.	—
Hedin, Ltd.	—
Heneage Metals, Ltd.	14
Hepburn Conveyor Co., Ltd.	16
Heywood, S. H., & Co., Ltd.	—
High Speed Steel Alloys, Ltd.	—
Hills (West Bromwich), Ltd.	—
Holman Bros., Ltd.	—
Holmes, W. C., & Co., Ltd.	10
Holroyd & Hall, Ltd.	—
Hooker, N. (Foundry Supplies), Ltd.	—
Hooker, W. J., Ltd.	—
Ilford, Ltd.	—
Imperial Chemical Industries, Ltd.	—
Incandescent Heat Co., Ltd.	—
Ingersoll-Rand Co., Ltd.	—
International Combustion, Ltd.	—
Interplas	—
J.S. Pattern Products, Ltd.	—
Jackman, J. W., & Co., Ltd.	3
Jacks, Wm., & Co., Ltd.	155
Joy Sullivan, Ltd.	6
Keith Blackman, Ltd.	—
L.M.S. Products, Ltd.	—
Lafarge Aluminous Cement Co., Ltd.	—
Laidlaw, Drew & Co., Ltd.	—
Leicester Lovell & Co., Ltd.	—
Levy, B., & Co. (Patterns), Ltd.	44
Lones, Joseph, Laboratories	—
Lord, E. S., Ltd.	—
Luke & Spencer, Ltd.	—
Macnab & Co., Ltd.	—
Major, Robinson & Co., Ltd.	—
Mansfield Standard Sand Co., Ltd.	—
Marshall, Thomas (Loxley) Ltd.	—
Mathison, John, Ltd.	—
Matthews & Yates, Ltd.	—
May, J. H., Ltd.	—
Mead McLean & Co., Ltd.	—
Mellor Mineral Mills, Ltd.	—
Metalectric Furnaces, Ltd.	—
Metalline Cement Co., The	—
Metals & Equipment (Wolverhampton), Ltd.	—
Midgley & Son, Ltd.	—
Midland Monolithic Furnace Lining Co., Ltd.	49
Midland Tar Distillers, Ltd.	—
Modern Furnaces & Stoves, Ltd.	20
Molineux Foundry Equipment, Ltd.	—
Monometer Manufacturing Co., Ltd.	5
Morganite Crucible, Ltd.	—
Newton Collins, Ltd.	—
Nicholl & Wood, Ltd.	—
Norris Equipment & Construction, Ltd.	46
North Derbyshire Metal Products, Ltd.	—
Norton Grinding Wheel Company, Ltd.	—
Norton Industries, Ltd.	45
Ormerod, R. E., Ltd.	49
Orthos, Ltd.	—
Palmer Aero Products, Ltd.	—
Parish, J., & Co., Ltd.	—
Park & Paterson, Ltd.	—
Parker Mitchell Engineering Co., Ltd.	—
Parmelee (G.B.), Ltd.	—
Passe, J. F., Co.	—
Paterson Hughes Engineering Co., Ltd.	—
Patterncrafts, Ltd.	—
Pearson, E. J. & J., Ltd.	—
Peco Machinery Sales, Ltd.	—
Perry, G., & Sons, Ltd.	44
Phillips, J. W. & C. J., Ltd.	—
Pickard, W., & Co., Ltd.	—
Pickford, Holland, Ltd.	—
Platt Metals, Ltd.	—
Pneulec, Ltd.	7
Polygram Castings Co., Ltd.	4
Precision Presswork Co. Ltd.	—
Price, J. T., & Co., Ltd.	—
Production Chemicals (Rochdale), Ltd.	—
Purimachos, Ltd.	—
Reavell & Co., Ltd.	—
Refined Iron Co. (Darwen), Ltd.	—
Reid, Wm., & Co.	48
Resinous Chemicals, Ltd.	—
Richards Structural Steel Co., Ltd.	—
Richardson Eng'g., Ltd.	—
Richardsons Moss Litter Co., Ltd.	—
Richardsons, R. J. & Sons Ltd.	—
Ridsdale & Co., Ltd.	—
Robinson, Thos., & Son Ltd.	—
Robson Refractories, Ltd.	—
Roper, E. A., & Co., Ltd.	—
Rowland, F. E., & Co., Ltd.	31
Rubery Owen & Co., Ltd.	—
Rule & Moffat	43
Rustless Iron Co., Ltd.	—
Safety Products, Ltd.	—
Salter, Geo., & Co., Ltd.	—
Schleidrop & Co., Ltd.	29
St. George's Engineers, Ltd.	—
Sheffield Smelting Co., Ltd.	—
Sheppard & Co., Ltd.	—
Sieber, J., Equipment Co., Ltd.	48
Sintokogio, Ltd.	—
Sklenar Furnaces, Ltd.	—
Smedley Bros., Ltd.	49
Smeeton, J. A., Ltd.	—
Smith, A., & Co.	49
Smith, A. (S. & B. Foundry Sands), Ltd.	—
Smith, John (Keighley), Ltd.	—
Smiths Motor Accessories, Ltd.	—
Soles, J. M.	—
Spencer & Halstead, Ltd.	—
Spermolin, Ltd.	—
Stansby, W., & Co., Ltd.	—
Stanton & Staveley Sales, Ltd.	13
Steels Engineering Installations	—
Stein, John G., & Co., Ltd.	—
Stephens, Wm., & Sons, Ltd.	—
Sterling Foundry Specialties, Ltd.	27, 28 & 46
Sternol, Ltd.	21
Suffolk Iron Foundry (1920), Ltd.	—
Sutcliffe Speakman, Ltd.	9
Tallis, E., & Sons, Ltd.	—
Taylor, J. (Syston), Ltd.	—
Thomas, G. & R., Ltd.	—
Thomas, Gwyn., & Co.	—
Thompson, John, Instrument Co., Ltd.	—
Thomson & McIntyre	—
Thor Tools, Ltd.	—
Tilghman's, Ltd.	—
Union Carbide, Ltd.	—
Unit Engineering Co.	—
United Fireclay Products, Ltd.	—
United States Metallic Packing Co., Ltd.	—
Verrolec, Ltd.	—
Victor Products, Ltd.	—
Wagner Heinrich, Maschinenfabrik	—
Wai-Met Alloys Co.	—
Walker, I. & I., Ltd.	—
Walsh Bros.	—
Ward, Thos. W., Ltd.	1
Warner & Co., Ltd.	17
Warrington Red Moulding Sand Co.	—
Watsons (Metallurgists) Ltd.	—
West Midland Refining Co., Ltd.	23
Whitecross Co., Ltd.	—
Wild-Barfield Electric Furnaces, Ltd.	—
Wilkinson Rubber-Linatex Co., Ltd.	—
Wilson Crucible Co., Ltd.	48
Witham, L. A., & Co.	—
Woking Pattern Works, Ltd.	—
Woodward Bros. & Copelin, Ltd.	47

Published by the Proprietors, Industrial Newspapers (Fuel & Metallurgical) Limited, John Adam House, 17/19, John Adam Street, London, W.C.2, and printed in Great Britain by Harrison & Sons, Limited, by Appointment to Her Majesty The Queen, Printers, London, Hayes (Middx) and High Wycombe.

TITAN
FOUNDRY PLANT

THE PAST - CONSTRUCTIONAL have supplied Cupolas under the "TITAN" trade mark to all parts of the world.

THE PRESENT - CONSTRUCTIONAL are supplying Cupolas to customers in this country and overseas, both Cold Blast and Hot Blast installations, utilising either independently fired or recuperative blast heaters.

THE FUTURE - CONSTRUCTIONAL offer a full range of Melting Plant complete with mechanised handling facilities; Cold Blast Cupolas, Hot Blast Cupolas with either independently fired or Recuperative Blast Heaters, oil fired or electric receivers.

CUPOLAS

THE CONSTRUCTIONAL ENGINEERING CO LTD

TITAN WORKS · CHARLES HENRY ST. · BIRMINGHAM 12.

PHONE MIDLAND 4753-4
GRAMS STRUCTURAL

A MEMBER OF THE B.H.D. ENGINEERS LTD. GROUP

FOUNDRY TRADE JOURNAL

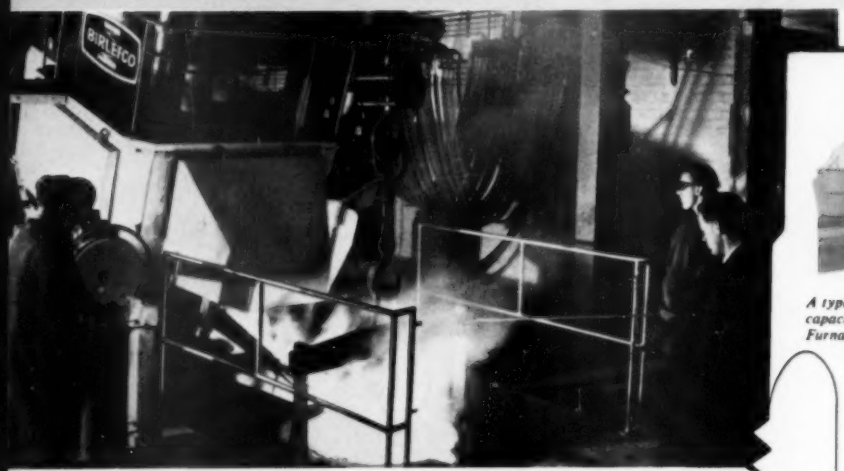
EST. 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

VOL. III
No. 2330
Registered at the G.P.O. as a Newspaper

AUGUST 3, 1961
Offices: John Adam House, John Adam St., London, W.C.2

Single Copy 1/-. By Post 1/4. Annual Subscription, Home 52/-, Abroad 60/- (Prepaid)

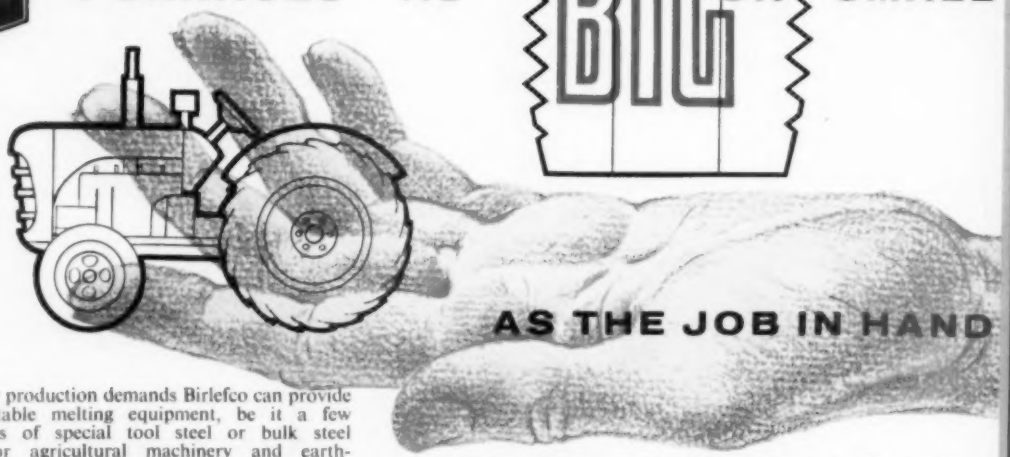


Pouring from a Birlefco 3 ton capacity Arc Furnace.

A typical Birlefco 10 cwt. capacity High Frequency Furnace

BIRLEFCO

FURNACES AS BIG OR SMALL AS THE JOB IN HAND



Whatever your production demands Birlefco can provide the most suitable melting equipment, be it a few hundredweights of special tool steel or bulk steel production for agricultural machinery and earth-moving equipment. If there's metal to be melted, Birlefco present a unique combination of design, experience and manufacturing skill, always abreast of new trends and new techniques.

Specialists in all types of melting equipment; Arc Furnaces from 1 to 150 tons capacity; Mains Frequency and High Frequency Melting Plant from 10 lbs to 20 tons capacity; Induction Heating Equipment.

BIRLEC-EFCO (MELTING) LTD Westgate · ALDRIDGE Staffs *Telephone Aldridge 52071*

Manufactured in Australasia: Birlec-Major Pty Ltd., Moorabbin, Victoria, Australia. In Canada: Birlefco-Lindberg Ltd., Toronto
In India: AEI (India) Pvt. Ltd., Calcutta. In South Africa: AEI South Africa (Pty) Ltd., Johannesburg SM/BE.6505